

5.3 EROS Data Center (EDC)

5.3.1 Key Interfaces: EDC DAAC-ECS

The EDC ECS DAAC interfaces with multiple entities external to the DAAC. Figure 5.3.1-1 schematically illustrates the interfaces between the ECS at the EDC DAAC and its external entities.

The following further describes the external entities, including those identified to support interface testing:

- EDC V0 DAAC - This interface provides access to data or other information that comes into the DAAC via the V0 IMS system but are archived into ECS, or into both ECS and the EDC V0 archive. The migration of V0 data sets into ECS will occur via this interface.
- SMC - This interface provides the capability for the EDC DAAC to receive configuration data, scheduling directives, policy and procedure information, and user registration information. The EDC DAAC sends its system performance, accounting data, resource utilization data and status reports to SMC.
- Users - This interface is the mechanism for user community access to ECS data, products and services.
- ASTER GDS - This interface provides EDC ECS user or ASTER GDS user to view the data holding and order production data from the other system. EDC DAAC interfaces via media with ASTER GDS for ingesting Level 1 data.
- ASTER SCF - This interface supports the ASTER Instrument Team. ASTER algorithms, metadata, science software, test data are example of things that will cross this interface and test results are sent back to ASTER SCF.
- GSFC DAAC - This interface allows EDC DAAC to ingest MODIS Level 2 data from GSFC DAAC
- Ancillary Source - (NOAA or other DAACs) This interface supports access to non-EOS data sets to satisfy ECS user query and to retrieve ancillary data for ECS standard product generation.
- MODIS SCF - This interface supports the MODIS Instrument Team. MODIS algorithms, metadata, science software, test data are example of things that will cross this interface and test results are sent back to MODIS SCF.
- Landsat 7 Processing System (LPS) - The interfaces between EDC ECS DAAC and LPS are described in detail in Section 5.3.2.4.

5.3.2 EDC ECS Related Mission and Operations Activities

This section describes the mission and operation activities specific to the ECS portion of the EDC DAAC during Release B and the retained activities from Release A. The EDC Products from the Technical Baseline and the EDC User Pull Baseline during Release B are also included in this section.

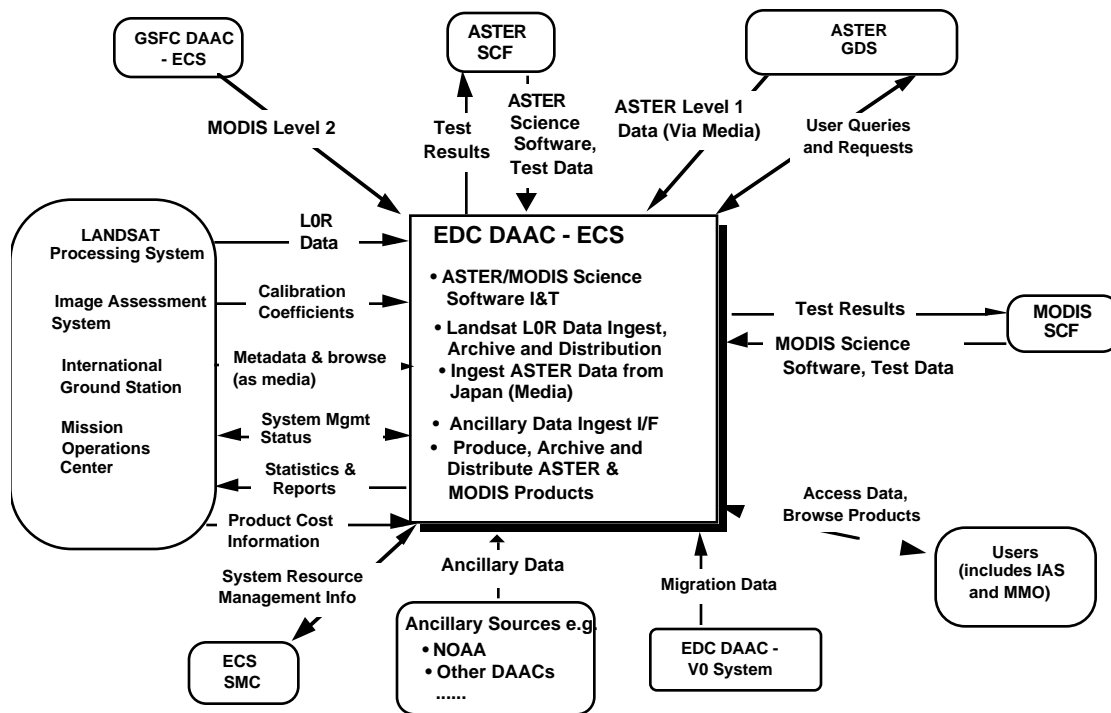


Figure 5.3.1-1. Release B Key Interfaces: EDC DAAC-ECS

5.3.2.1 EDC Release B

This is a list of the mission and operation activities specific to the ECS portion of the EDC DAAC during release B.

- Full functionality to support EOS AM-1 science operations
- Support operations for AM-1: Ingest MODIS data from GSFC, produce MODIS higher level land products, Ingest ASTER Level 1 data from ASTER GDS, produce ASTER higher level land products
- Full functionality to support Landsat 7 data archive and distribution
- Support MODIS & ASTER version 2 algorithm I&T for EOS AM-1
- ASTER DAR processing
- Support access to V0 data products
- Support access/distribution of products

5.3.2.2 EDC Release A

The following are the Release A mission and operations activities for the EDC DAAC. Some of this activities will be retained in Release B.

- ASTER algorithm integration and test
- AM-1 interface test support

- Landsat 7 interface test support
- V0 data migration, archive and distribution
- Transition to Release B baseline
- Above activities parallel to V0 operations

5.3.2.3 EDC Products from Technical Baseline

Table 5.3.2.3-1 provides the products in the ECS Technical Baseline (Based on the AHWGP) which are either produced or archived at the DAAC in Release B.

Table 5.3.2.3-1. EDC Release B Product Baseline

Instrument	Platform	Production DAAC	Archival DAAC	Product Level
ASTER	AM1	EDC	EDC	1A
ASTER	AM1	EDC	EDC	1B
ASTER	AM1	EDC	EDC	2
ASTER	AM1	EDC	EDC	4-SP
MODIS	AM1	EDC	EDC	3
MODIS	AM1	GSFC	EDC	2
MODIS	AM1	GSFC	EDC	3
MODIS	AM1	GSFC	EDC	4
ETM+	Landsat 7	LPS	EDC	0R

5.3.2.4 EDC Activities for the Landsat 7 Mission

A major mission to be supported by EDC during Release B is Landsat 7. This section provides a description of the mission responsibilities of the EDC DAAC for Landsat 7.

The Landsat 7 satellite collects terrestrial data for national security, commercial, and civilian users. The Landsat 7 System is a space/ground system providing a global landmass data archive refreshed on a periodic basis. As described in Section 4.2, metadata and browse data associated with global refresh are passed to ECS so users can search for available data. ECS receives, archives and distributes Landsat 7 data and provides the interface to the Landsat 7 user community. All ECS registered users are permitted access to Landsat 7 Level 0R data, metadata and browse data archived by ECS.

The Landsat 7 mission provides Level 0R data for archive by ECS. Level 0R data is a viewable image product with radiometric and geometric correction information appended but not applied.

The Landsat 7 MOC schedules and controls acquisition requests, independent of ECS, based on the need for periodic global coverage (global refresh). Once the data are captured and processed, the LPS passes the Level 0R data, Level 0R browse, and associated inventory metadata to the ECS for archive. The MOC then receives metadata from ECS to evaluate cloud coverage and determine if acquisitions need to be repeated.

Level 0R data, Level 0R browse, and associated inventory metadata are provided to ECS on a sub-interval basis. An interval, which may contain multiple subintervals, is the time duration

between the start and stop of an imaging operation of the Landsat 7 ETM+ instrument. A subinterval is continuous instrument data within one Landsat 7 contact. Subintervals are caused by breaks in the wideband data stream due to communication dropouts and/or the inability of the spacecraft to transmit a complete observation within a single Landsat 7 contact period.

After the LPS completes processing of data, it notifies ECS that the data is available for transfer. The LPS provides the ECS with a data availability notice which identifies Level 0R data, associated inventory metadata and Level 0R browse available for pickup by the ECS. Subsequent to the receipt of the data availability notice and within 8 hours, ECS pulls the available data from the LPS and completes archival of the data. ECS will receive multiple files representing subintervals, one file per subinterval band/data type. The number of files archived depends on the number of subintervals acquired during each Landsat 7 contact period. The ECS sends an acknowledgment upon successful transfer of data from the LPS and archival within ECS. After archival, the users will be able to search and order the data. Data will be made available to delivery services or mail within 24 hours of ordering; however electronic delivery may be faster.

All ECS registered users are permitted access to ECS held Landsat 7 Level 0R data and browse data. The identity of users and their requests remain confidential. Landsat 7 directory information and guide information, providing general Landsat data information helpful to users, will be developed by the project scientist and the EDC DAAC scientist and be placed in the Global Change Master Directory and on a guide server at the EDC DAAC. A user may query the availability of Level 0R archive data, and view Level 0R browse images and Level 0R metadata through the ECS. Searches may be based on any combination of geographic location, time of image collection, spectral band, sun elevation angle, cloud cover, and Worldwide Reference System (WRS), and other parameters as defined through the Landsat 7 metadata. The WRS is a set of predefined grids related to orbit revisit, and are consistent for Landsat 4, 5, and 7. As a result of the query the user will receive inventory metadata that represents the queried data.

Once the data of interest are identified, users may order standard Level 0R products. Upon request, a user will receive a cost estimate of a potential Landsat 7 Level 0R data order. Product cost information provided to the ECS by the Landsat 7 MMO will be used in assessing charges for user orders. In response to a product order, the ECS will distribute WRS scene data from the subinterval representing the data requested. As a result of user inquiry against a product order, the ECS provides product order status to the user.

The ECS distributes products electronically over communication networks or creates physical media in response to user orders. The ECS writes the physical media, packages, and distributes Landsat 7 products to requesters. Users will be able to order one or more scenes or a subinterval of scenes. Scenes can be identified by WRS or geographically by latitude and longitude.

The L-7 Image Assessment System (IAS) receives up to 10 scenes per day of Level 0R data from ECS to support ETM+ instrument calibration and image assessment. Based on IAS analysis, calibration information and associated metadata are provided to ECS.

The Landsat 7 IGSs provide the ECS with inventory metadata and browse for IGS Landsat 7 data holdings. ECS provides the capability for ECS/Landsat 7 users to search for these data.

ECS/Landsat 7 users submit product orders for IGS held data directly to the IGS. The IGS delivers these products directly to the ECS/Landsat 7 user.

To support the above flows, the ECS and the Landsat 7 system also exchange system management status. The ECS also provides the MMO with statistics and reports.

5.3.2.5 EDC Activities for the ASTER Mission

A major mission to be supported by EDC during Release B is ASTER. This section provides a description of the ASTER mission responsibilities of the EDC DAAC.

The ECS and the ASTER GDS will work together to provide ground support for mission operations and science data processing for the ASTER instrument onboard the EOS AM-1 spacecraft. This support includes spacecraft and instrument mission operations (planning, scheduling, control, monitoring, and analysis), science data processing (data processing, distribution, and archival), and ground system communications and management. In addition, the ASTER GDS will be interoperable with ECS so that an EOSDIS user or ASTER GDS user will be able to view the data holding and order production data from the other system.

The ECS is a component of the EOSDIS. ECS supports the planning, scheduling, and control of U.S. EOS spacecraft and instruments. In addition to fully supporting the EOS series, the ECS provides information management and data archive and distribution functions for other NASA Earth science flight missions, NASA instruments flown on non-NASA spacecraft, and for other NASA held Earth science data. ECS is composed of three segments defined to support three major operational areas: flight operations, science data processing, and communications/system management.

The ASTER GDS has been defined as a hierarchy of segments, subsystems, and components. Three ASTER GDS segments are defined to support three major operational areas: the ASTER Operation Segment (AOS), the Communications and System Management Segment (CSMS), and the Science Data Processing Segment (SDPS). These segments closely resemble the ECS segments.

The data flows between ECS and ASTER GDS fall into 8 categories. They are Pre-Mission Interface, DAR Handling, Planning and Scheduling/Command Load Generation, Instrument Operations, Science Data handling, User Search and Request Interface, Product Request and Delivery, and Network Management.

A brief description of each of the 8 data flow categories is follows.

For science software development, the ASTER GDS performs functions similar to those of a Science Computing Facility (SCF). Science software for the generation of ASTER standard products will be developed based on algorithms developed by ASTER Science Team (AST) member in Japan and the U.S. Operationally, ASTER GDS is expected to perform standard Level 1 processing for ASTER science data. Higher level (Level 2+) standard product generation, using U.S. AST algorithms, will be performed by ECS at EDC DAAC. All algorithms, source code, and documentation associated with the generation of ASTER standard

products will conform to ECS standards and will reside at both ASTER GDS and ECS at EDC DAAC.

The AST will be responsible for development of the ASTER Long Term Instrument Plan (LTIP) and Long Term Science Plan (LTSP) for data acquisition. Other important pre-mission data flows include Operations Data Base containing instrument telemetry formats, command formats, procedures, limits, constraints, activity definitions and DAR Development Data Base describing instrument configurable parameters, and constraints.

At launch, ASTER will have a list of planned data acquisition targets that will be agreed to by the Senior Project Scientist and the AST. Additions and changes to the ASTER target list will occur via DAR, which may be submitted by approved users. The ECS SDPS will provide displays to guide EOSDIS users in the development of DARs for the ASTER instruments. EOSDIS ASTER DARs that pass the SDPS validation checks will be stored in the ECS SDPS and transmitted to the ASTER IMS. The ASTER ICC, under guidance of the AST, will accept or deny the DARs based on approved guidelines and priorities. An EOSDIS user may query the status of a specific EOSDIS ASTER DAR from ECS SDPS at any time.

Each week, the ASTER ICC will submit to the EOC an ASTER Instrument Resource Profile covering the planned activities for the target week occurring approximately 3-4 weeks in the future. Updates to the Instrument Resource Profile, in the form of Instrument Resource Deviation List will be accepted by the EOC up to 3 weeks prior to the target week. Based on the weekly Preliminary Resource Schedule, the ASTER ICC will develop Instrument Activity List covering the ASTER instrument operations for each of day of the target week.

On a daily basis, the EOC will integrate the ASTER Instrument Activity List with the activity lists of the other AM-1 instruments and spacecraft subsystem, creating a conflict-free 24-hour Detailed Activity Schedule.

During normal operations, the EOC and ASTER ICC will have two real time contacts with the AM-1 spacecraft each orbit. During the real time contact, the EOC will be responsible for issuing spacecraft and instrument commands. The EOC will format and transmit validated commands to the AM-1 spacecraft via EDOS. Both the EOC and ASTER ICC will receive and monitor critical spacecraft and instrument real time housekeeping telemetry parameters.

All ASTER science data will be downlinked from the AM-1 spacecraft and forwarded to EDOS for Level 0 processing. EDOS will construct the ASTER Level 0 Production Data Set (PDS) from the raw science data stream, and make the data set available for postal pickup within 21 hours of receipt of the last packet at EDOS. The ASTER SDPS will begin data production upon receipt of the Level 0 data from EDOS. It is expected that the ASTER SDPS will be responsible for the routine generation ASTER Level 1a products. The ASTER GDS will process 40% of the Level 1a data to Level 1b. ASTER Level 1a and 1b products, including associated ancillary data, metadata, and browse files will be available for postal pickup at the ASTER SDPS within 24 hours following the receipt of the corresponding Level 0 PDS from EDOS, and delivered to the ECS EDC DAAC.

The ASTER GDS and ECS will support two-way Level 3 interoperability. If any EOSDIS user wishes to search the ASTER GDS system, the ECS will provide an ECS User Authentication

Request to the ASTER GDS. The ASTER GDS will respond with ECS User Authentication Information providing the access privileges granted. EOSDIS users will be able to submit queries for ASTER GDS products to the ECS SDPS. The ECS will pass the user query to the ASTER GDS, which will respond with the search results. The ECS SDPS presents the search results to the EOSDIS users. Similarly, an ASTER GDS user can perform a search on ECS from ASTER GDS.

An EOSDIS user may submit a Product Request or a Product Generation Request for an ASTER GDS product to the ECS SDPS. The ECS SDPS will pass the Product Request or a Product Generation Request to the ASTER GDS. The ASTER SDPS will respond with Product Delivery Status information, which the ECS SDPS forwards to the user. The EOSDIS user may also query the status of the previous Product Request submitted to ASTER GDS. Likewise, an ASTER GDS user may submit a Product Request or a Product Generation Request for an ECS product to ASTER GDS SDPS and subsequently query the status of the request.

Both ECS and ASTER GDS will deliver their data products directly to the user (requester) of the data. The receiver of the data will be responsible for data delivery expenses, such as the cost associated with media and shipping.

The ECS CSMS and ASTER GDS CSMS will interface to exchange network management information associated with communications between the ASTER GDS and the ECS. In particular, this involves status, schedule, and fault isolation coordination associated with Japanese network.

5.3.2.6 EDC User Pull Baseline

Table 5.3.2.6-1 lists the Data Volumes and Usage Estimates for the EDC DAAC. See section 5.1.2 for a description of how the data was developed and definition of each of the parameters.

Table 5.3.2.6-1. EDC Data Volumes and Usage Estimates

	1-Apr-97		1-Apr-98		1-Apr-99		1-July-99		1-Jan-00	
	Low	High	Low	High	Low	High	Low	High	Low	High
Archive Vol (TB)	0	0	5.564	5.564	150.131	150.131	195.205	195.205	284.102	284.102
Distrib. Vol/yr (TB)	0	0	11.128	11.128	205.622	205.622	277.081	277.081	272.076	272.076
GB/day produced/migrated	0	0	15.24	15.24	492.43	492.43	483.67	483.67	483.67	483.67
#Users/yr	0	0	3000	4000	4000	6000	5000	6500	5500	7000
#DAAC Accesses/yr	0	0	30000	80000	40000	120000	50000	130000	55000	140000

5.3.3 Day in the Life of ECS at the EDC DAAC

Activities described in this section occurred on Wednesday, 01-Sep-99, during Epoch “k.” This section provides a retrospective look at the operational activities of the day. That is, it is the “as executed” data for that day. Activities (and their key metrics) performed with ECS resources at the DAAC are shown in Table 5.3.3-1. Note that these are daily averages for Epoch k. Data for

this day may vary from the average. Figure 5.3.3-1 shows a composite summary of these activities.

Figures 5.3.3-2 through 5.3.3-8 show Release B and Release C activities leading up to and during this period. Activities related to Releases C & D missions have not been defined. Some non-operational activities may have an impact on operations by reassigning resources from operations to test. However, this “Day in the Life” material assumes there were no impacts from these activities to ingest, production, archive and data distribution operations.

Table 5.3.3-1. Activities in the Day in the Life of ECS at EDC (1 of 2)

Activity	Description	Metrics (daily average)	
ECS production planning	<u>Processing</u>	<u>Number of processes</u>	
	• AM1/ASTER	962	
	• AM1/MODIS	1,334	
	• AM1/Subsetting*	3,600	
	<u>Reprocessing</u>		
	• AM1/ASTER	962	
ECS ingest	• AM1/MODIS	1,334	
	• AM1/Subsetting*	3,600	
	<u>Processing</u>	<u>Ingests per day</u>	
	• L-7/ETM+	48 from L-7 processing	
	• AM1/ASTER	1 from tape	
	• AM1/MODIS	12 from EDOS	
ECS product generation	<u>Reprocessing***</u>		
	• AM1/ASTER	48 from archive	
	• AM1/MODIS	48 from archive	
	<u>Other</u>		
	• Migrated V0 data	48 from V0 migration system	
	• Ad Hoc data**	96 from miscellaneous sources	
ECS archive	<u>Processing</u>	<u>Hours of product generation</u>	
	• AM1/ASTER	7 days per week, 24 hours/day	
	• AM1/MODIS	7 days per week, 24 hours/day	
	• AM1/Subsetting*	7 days per week, 24 hours/day	
	<u>Reprocessing</u>		
	• AM1/ASTER	7 days per week, 24 hours/day	
ECS archive	• AM1/MODIS	7 days per week, 24 hours/day	
	• AM1/Subsetting*	7 days per week, 24 hours/day	
	<u>Processing</u>	<u># of Files</u>	<u>Vol. (MB)</u>
	• L-7/ETM+ archive	300	139,400
	• AM1/ASTER processing	2,771	193,001
	• AM1/MODIS processing	707	44,125
ECS archive	• AM1/Subsetting*	1,508	103,721
	<u>Reprocessing</u>		
	• AM1/ASTER reprocessing	2,771	193,001
	• AM1/MODIS reprocessing	707	44,125
	• AM1/Subsetting reprocessing*	1,508	103,721
	<u>Other</u>		
ECS archive	• Migrated V0 data	151	15,100
	• Ad hoc data**	350	3,500

Table 5.3.3-1. Activities in the Day in the Life of ECS at EDC (2 of 2)

Activity	Description	Metrics (daily average)				
ECS electronic data distribution through ECS client or web	<ul style="list-style-type: none">• User pull• Number of user accesses per day	Available 7 days/week, 24 hours/day 358				
ECS hard media data distribution	<ul style="list-style-type: none">• Distribution of hard media	<table><tr><td><u>Vol. (MB)</u></td><td><u># of Orders</u></td></tr><tr><td>480,247</td><td>25</td></tr></table>	<u>Vol. (MB)</u>	<u># of Orders</u>	480,247	25
<u>Vol. (MB)</u>	<u># of Orders</u>					
480,247	25					
ECS user services	<ul style="list-style-type: none">• Staffed hours	5 days/week, 8 hours/day				
ECS operations	<u>Science data production</u>					
	<ul style="list-style-type: none">• Staffed hours	7 days/week, 24 hours/day				
	<u>Other operations</u>					
	<ul style="list-style-type: none">• Staffed hours	7 days/week, 24 hours/day				
ECS engineering	<ul style="list-style-type: none">• Staffed hours	5 days/week, 8 hours/day				

* Subsetting includes those processes and files described as subsetting of various MODIS products. An equivalent processing and archive load for subsetting of reprocessed MODIS data is also assumed.

** "Ad Hoc" data are used as a place holder for any miscellaneous files that are archived. Examples include files ingested from hard media or electronically from users/SCFs.

*** "Ingest from archive" means that the data being reprocessed is being pulled from the ECS archive.

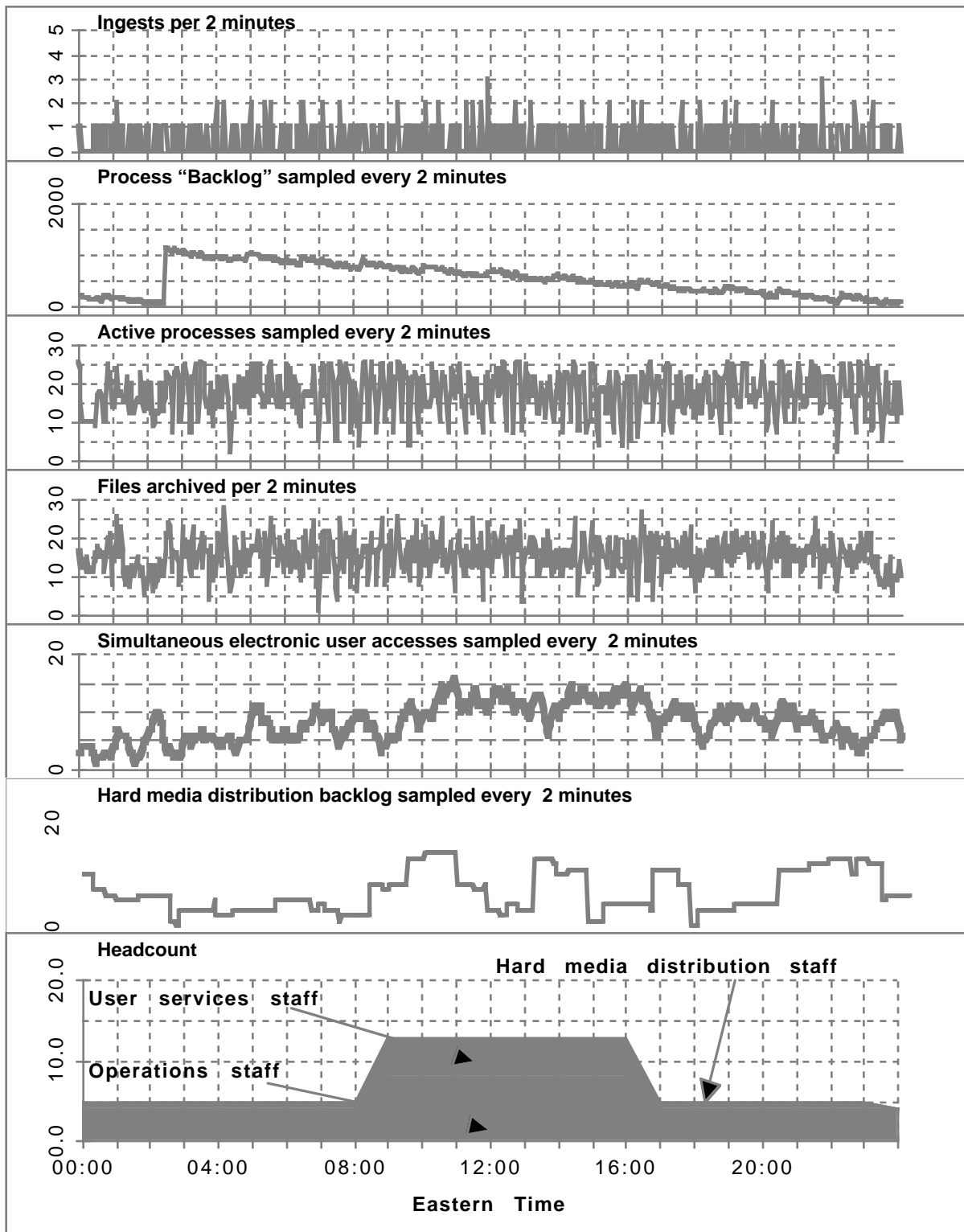


Figure 5.3.3-1. Overview of Day in the Life of ECS at EDC

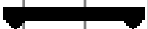






Name	1994	1995	1996	1997	1998	1999	2000
B: ECS development milestones			11/1			9/30	
B: HW installations			11/1		6/11		
B: Consent to ship Review			6/1				
B: Site acceptance testing			6/1		9/4		
B: Release Readiness Review			9/1				
B: Site HW capacity upgrades				5/1		7/30	
B: Site capacity upgrades testing				8/1		9/30	

Figure 5.3.3-2. EDC Related Release B Development Milestones







Name	1994	1995	1996	1997	1998	1999	2000
B: Science SW			10/8		2/17		
B: AM-1 ASTER mission version SW I&T			10/23		11/21		
B: AM-1 MODIS mission version SW I&T			10/23		11/20		
B: AM-1 ASTER science SW testing			11/24		12/19		
B: AM-1 MODIS science SW testing			11/21		12/18		
B: AM-1: ASTER L1 science SW				1/4		2/17	

Figure 5.3.3-3. EDC Science SW Activities













Name	1994	1995	1996	1997	1998	1999	2000
B: System integration				9/3 	2/13		
B: V0 interoperability				10/6 	12/5		
B: Landsat-7 System integration				9/24 	11/3		
B: IV&V				9/3 	11/20		
B: IV&V:EDC testing				9/3 	9/23		
B: I/F integration and test				11/21 	2/13		
B: System integration				11/21 	2/13		
B: SCF - ECS integration				11/21 	12/17		
B: DAAC - DAAC integration				11/21 	12/17		
B: ETS - ECS integration				12/18 	1/1		
B: EDOS-EBNET-ECS integration				1/2 	2/5		
B: ECS-ancillary data integration				2/6 	2/13		

Figure 5.3.3-4. EDC System Integration Activities












Name	1994	1995	1996	1997	1998	1999	2000
B: Mission Readiness				3/3 	6/30		
B: AM-1 S/C end to end				3/3 	3/9		
B: LANDSAT-7 ORT				3/20 	3/26		
B: AM-1 mission ops simulation				3/30 	4/3		
B: AM-1 operational readiness exercises				4/6 	6/30		
B: Training and certification				6/1 	1/15		
B: Operator training (classroom, IATO, IV&V, OJT, etc.)				6/1 	5/27		
B: Operator certification				5/27 			
B: Mission certification				2/17 	3/2		
B: AM-1 Landsat-7 EOSDIS Version 2 Baseline Test				2/17 	3/2		
B: ECS Version 2 Baseline Certification				2/17 	3/2		

Figure 5.3.3-5. EDC Mission Readiness, and Training and Certification Activities

Name	1994	1995	1996	1997	1998	1999	2000
B: Mission operations			6/1				3/3
B: V0 data migration & distribution			6/1				10/29
B: LANDSAT-7 operations				5/31			3/3
B: AM1 operations				6/30			3/3
B: AM-1 - ASTER product generation				6/30			3/3
B: AM-1 - MODIS product generation				6/30			3/3
B: AM-1 - ASTER reprocessing					6/30		3/3
B: AM-1 - MODIS reprocessing					6/30		3/3

Figure 5.3.3-6. EDC Mission Operations Activities

Name	1994	1995	1996	1997	1998	1999	2000
B: ECS maintenance and sustaining engineering			9/1				3/3
B: Operations readiness and performance assurance			9/1				3/3
B: Sustaining engineering			9/1				3/3
B: Property management, HW maintenance and ILS			9/1				3/3
B: Resource planning and performance analysis			9/1				3/3

Figure 5.3.3-7. EDC Maintenance and Sustaining Engineering Activities

Name	1994	1995	1996	1997	1998	1999	2000
C: ECS development milestones					2/1		4/1
C: HW installations					2/1		7/30
C: Consent to Ship Review					11/1		
C: ECS independent acceptance testing					11/1		12/1
C: Release Readiness Review					11/1		
C: Operations transition (estimated)						4/1	

Figure 5.3.3-8. EDC Related Release C Development Milestones

5.3.3.1 EDC Production Operations

This section provides an end of day view of processing and reprocessing of AM1/ASTER, AM1/MODIS, and AM1/Subsetting instruments' data. Two types of charts are shown for the processing and reprocessing production:

- **Process Backlog.** A process goes into a “backlog” state when data is ingested and its processing can be scheduled as a result of that ingest. For example, AM1/ASTER data is ingested once a day. The model assumes that all processes go into a “backlog” state at that time. A process may be one or more PGEs.
- **Active Processes.** The model assumes that two strings are available for use. The average time required for a process to complete is determined by dividing the number of processes executed in a day by the number of hours of production. The model assumes that each string can execute one or more processes in the two minute time step. The model also assumes that excess capacity is available and each process completes faster than the average as described below:
 - One third faster for AM1/ASTER, AM1/MODIS and AM1/Subsetting.

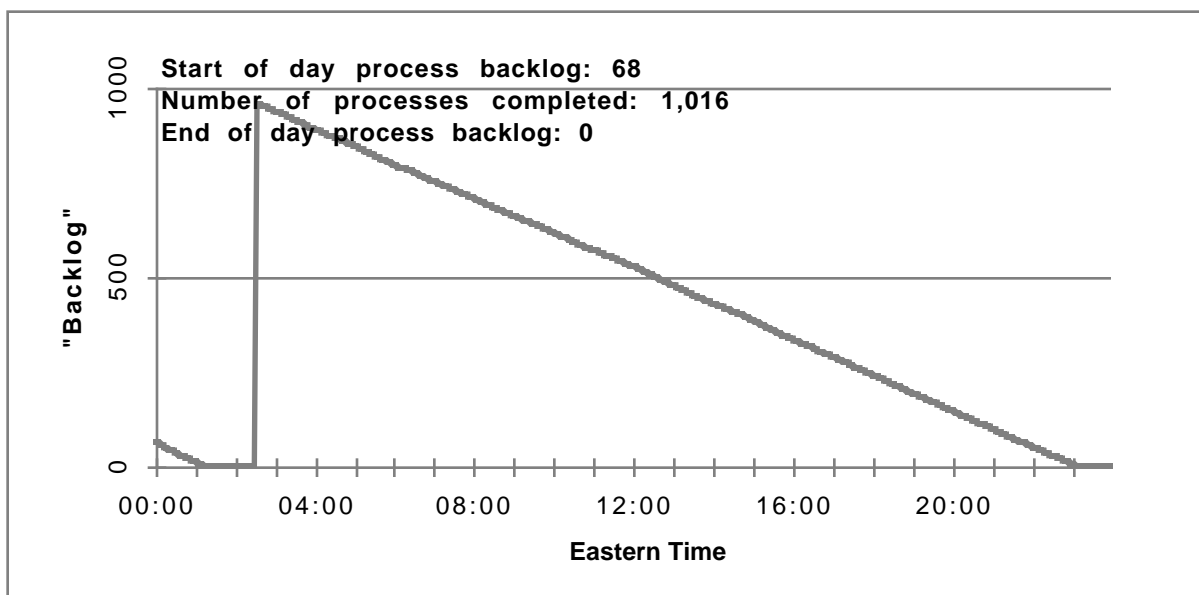


Figure 5.3.3.1-1. EDC AM-1/ASTER/Processing Process Backlog

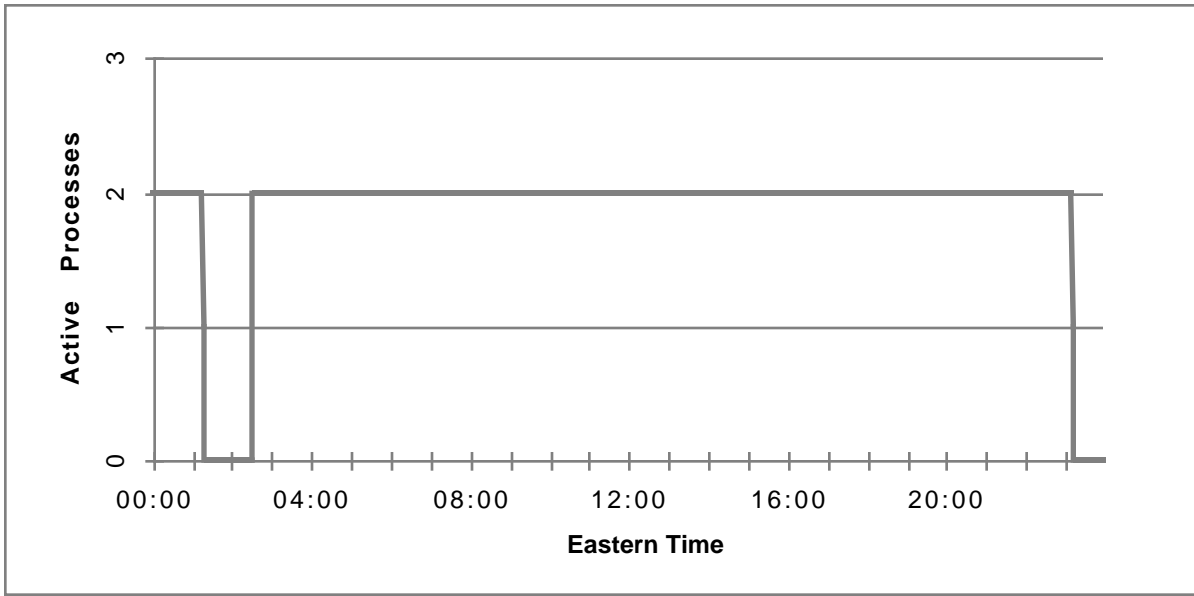


Figure 5.3.3.1-2. EDC AM-1/ASTER/Processing Active Processes

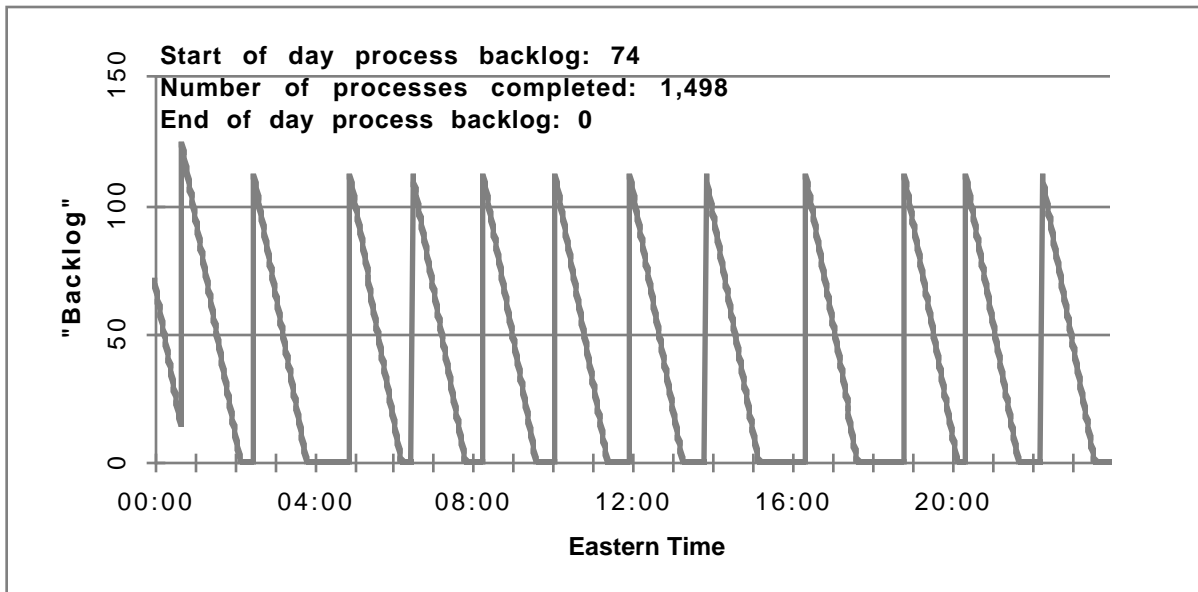


Figure 5.3.3.1-3. EDC AM-1/MODIS/Processing Process Backlog

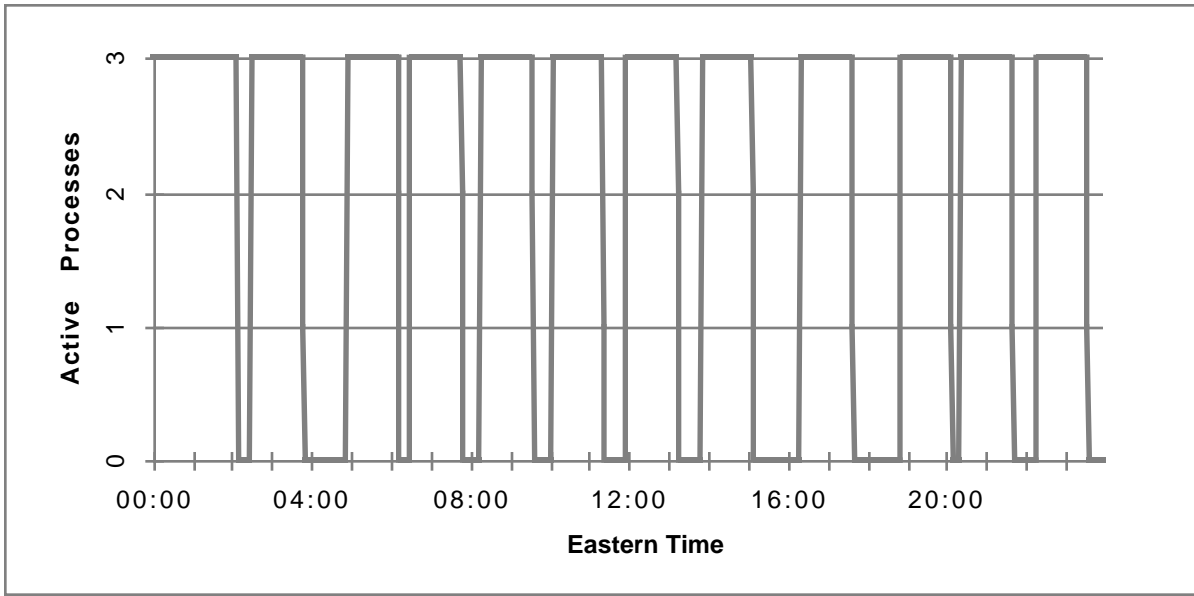


Figure 5.3.3.1-4. EDC AM-1/MODIS/Processing Active Processes

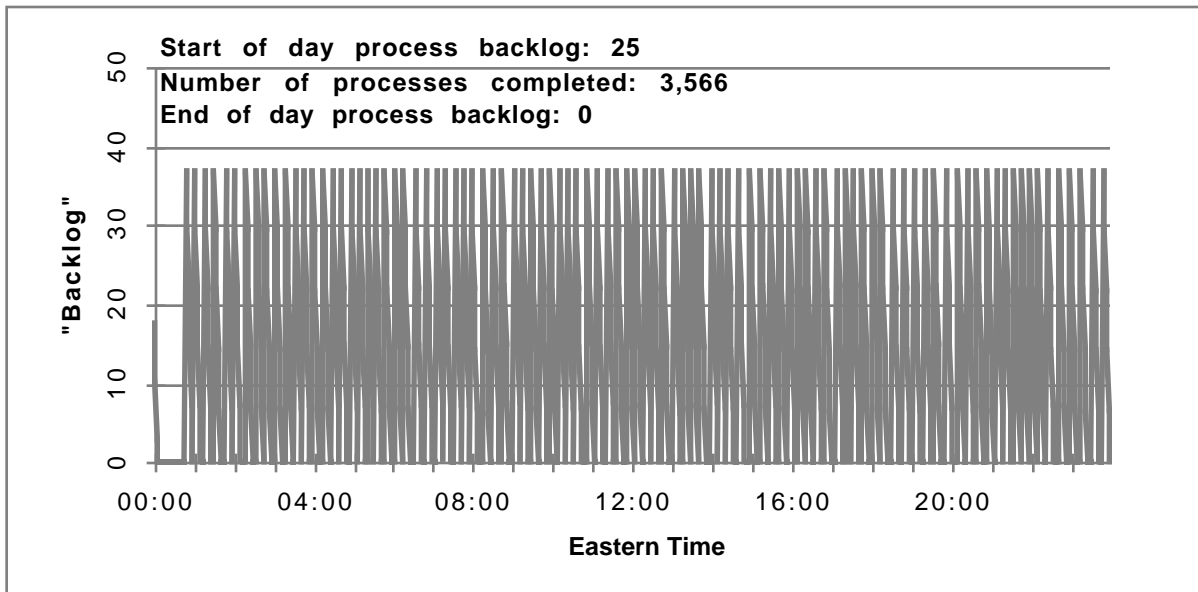


Figure 5.3.3.1-5. EDC AM-1/Subsetting/Processing Process Backlog

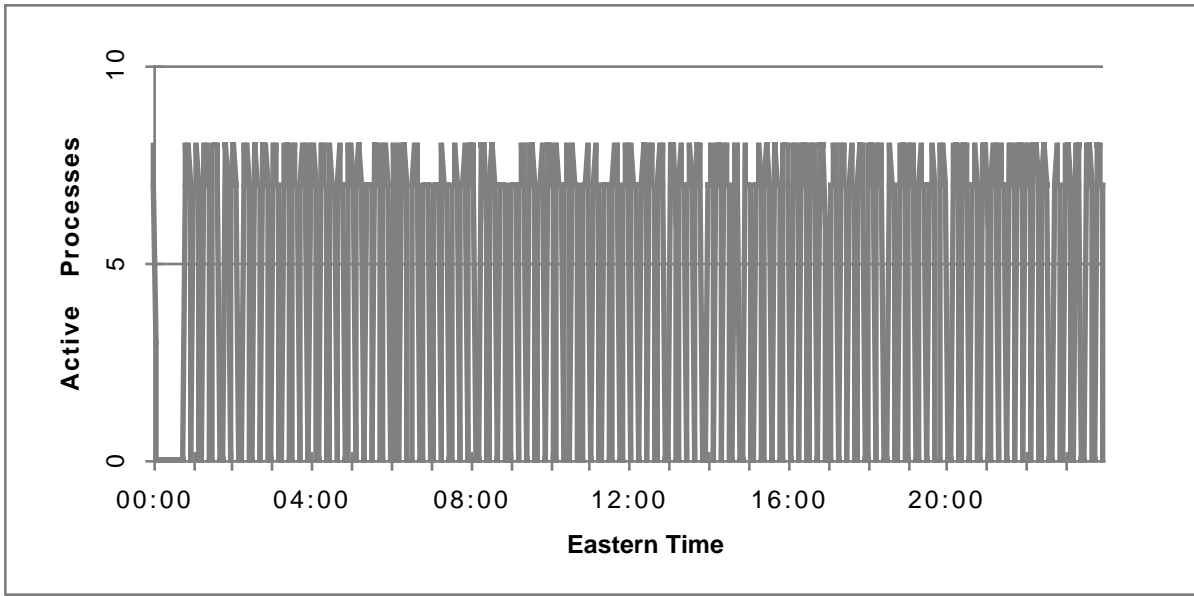


Figure 5.3.3.1-6. EDC AM-1/Subsetting/Processing Active Processes

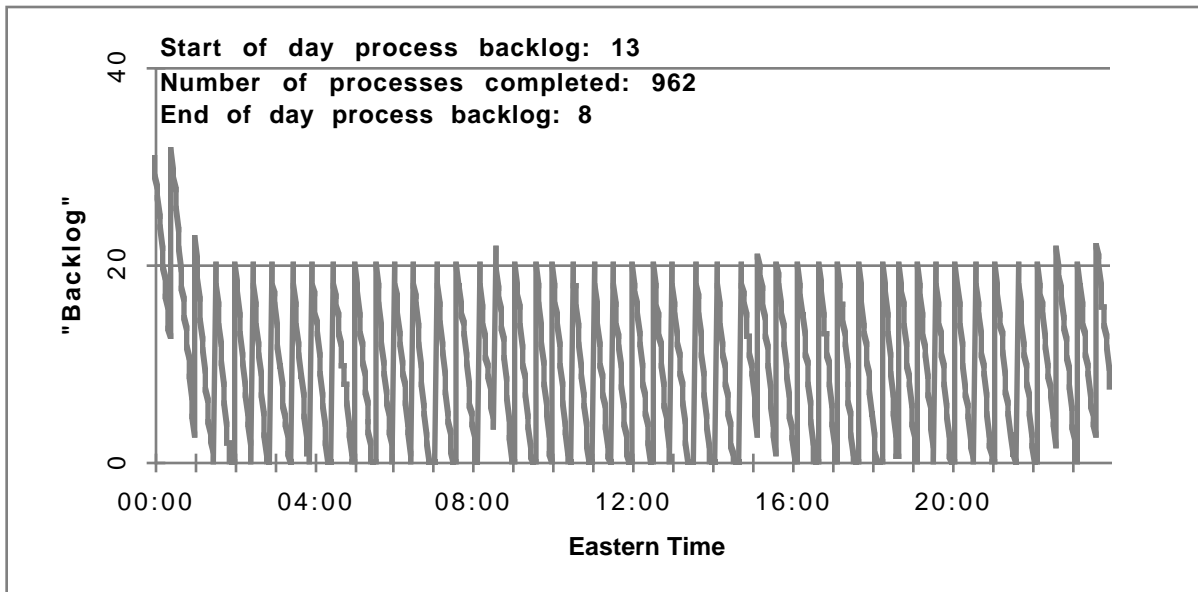


Figure 5.3.3.1-7. EDC AM-1/ASTER/Reprocessing Process Backlog

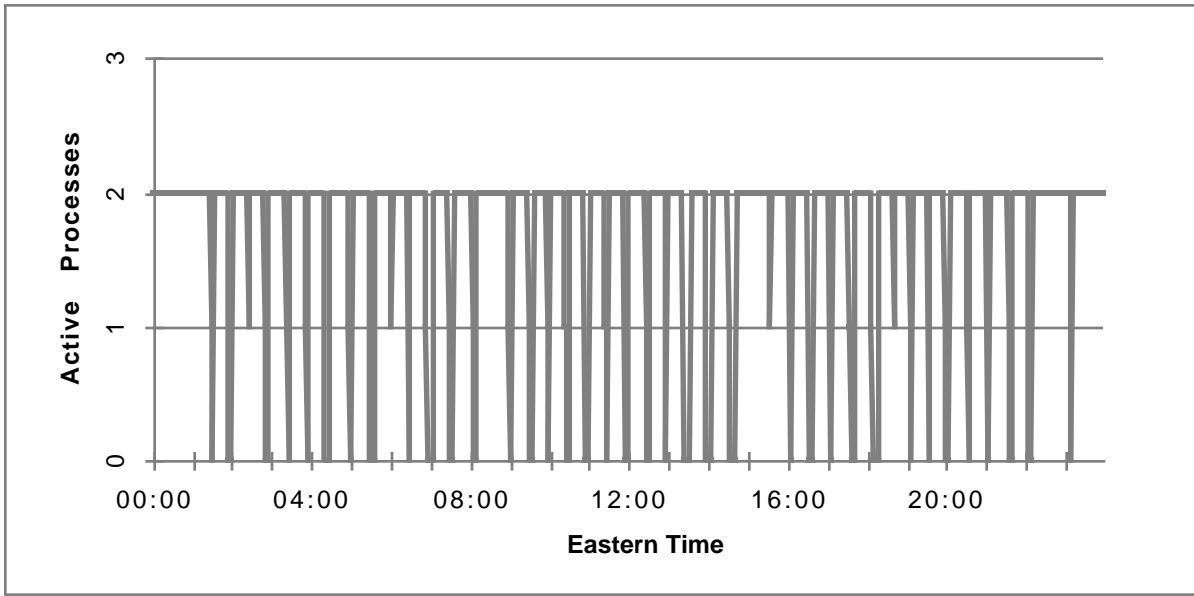


Figure 5.3.3.1-8. EDC AM-1/ASTER/Reprocessing Active Processes

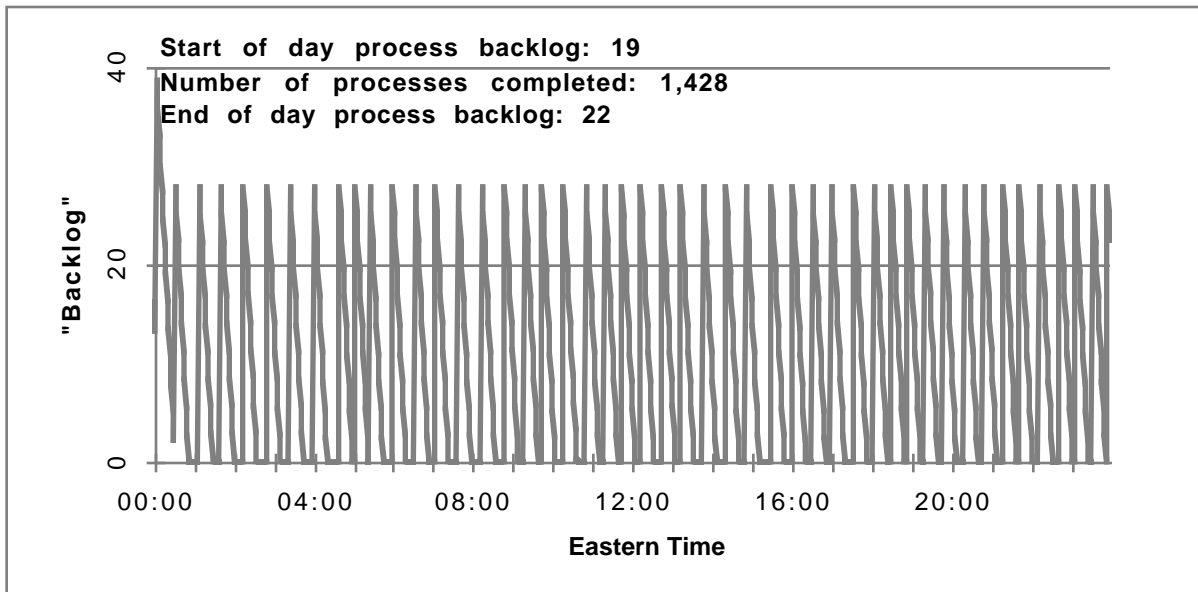


Figure 5.3.3.1-9. EDC AM-1/MODIS/Reprocessing Process Backlog

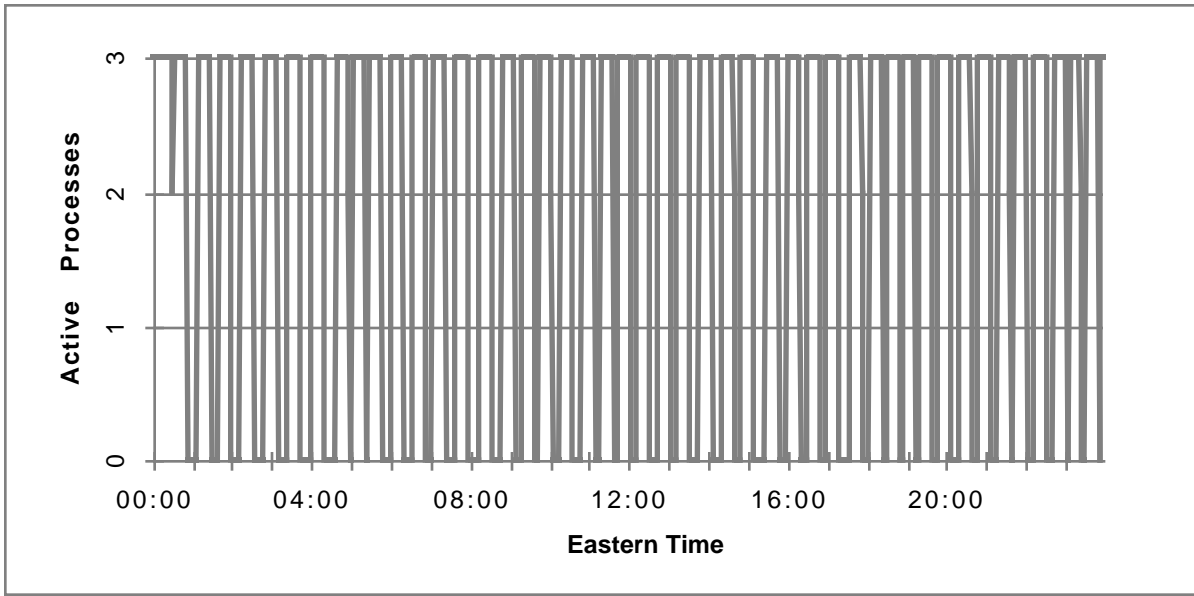


Figure 5.3.3.1-10. EDC AM-1/MODIS/Reprocessing Active Processes

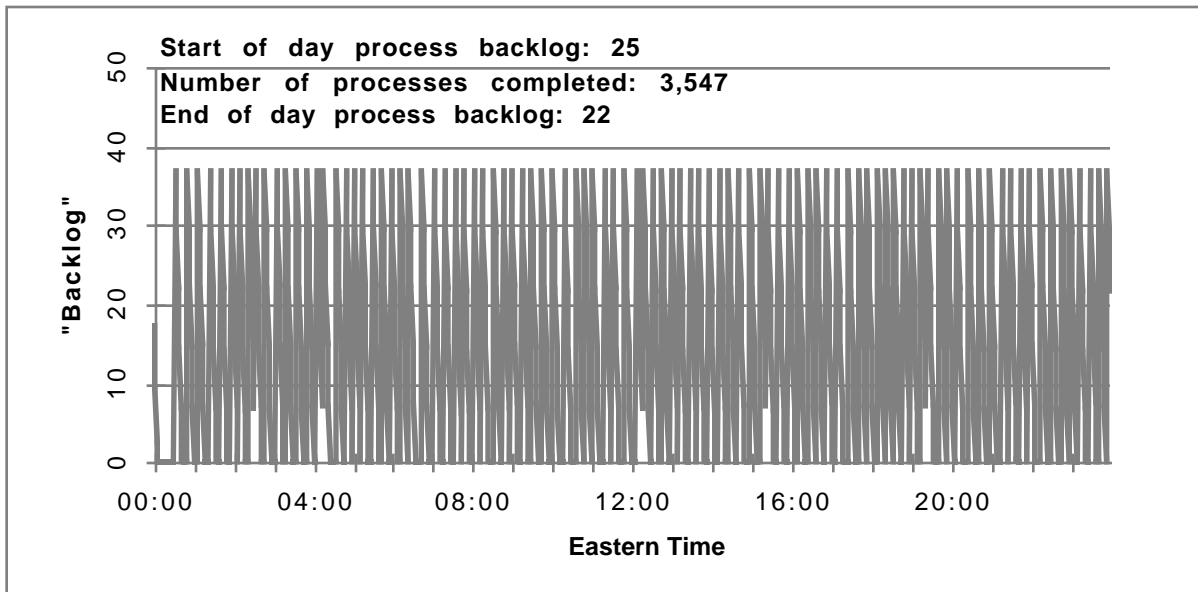


Figure 5.3.3.1-11. EDC AM1/Subsetting/Reprocessing Process Backlog

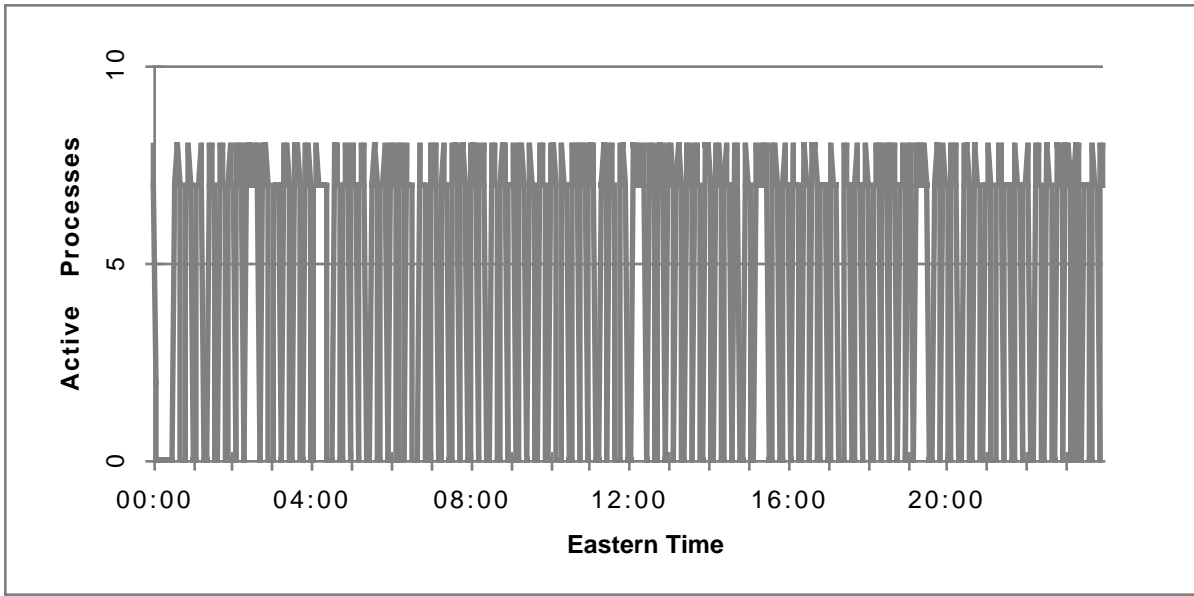


Figure 5.3.3.1-12. EDC AM1/Subsetting/Reprocessing Active Processes

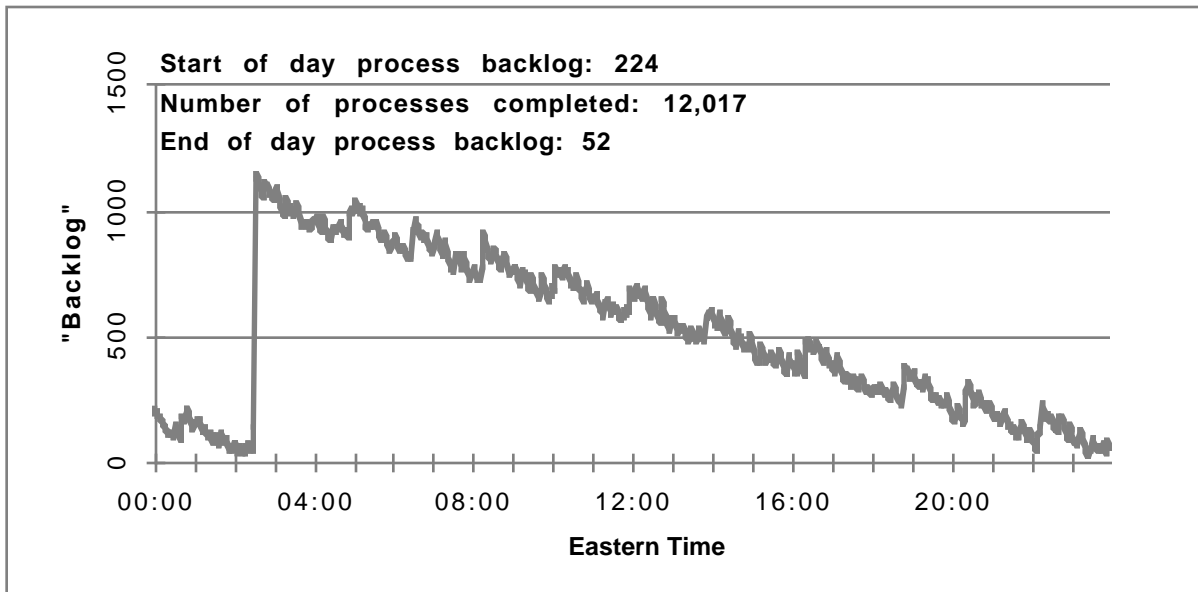


Figure 5.3.3.1-13. EDC Composite Process Backlog

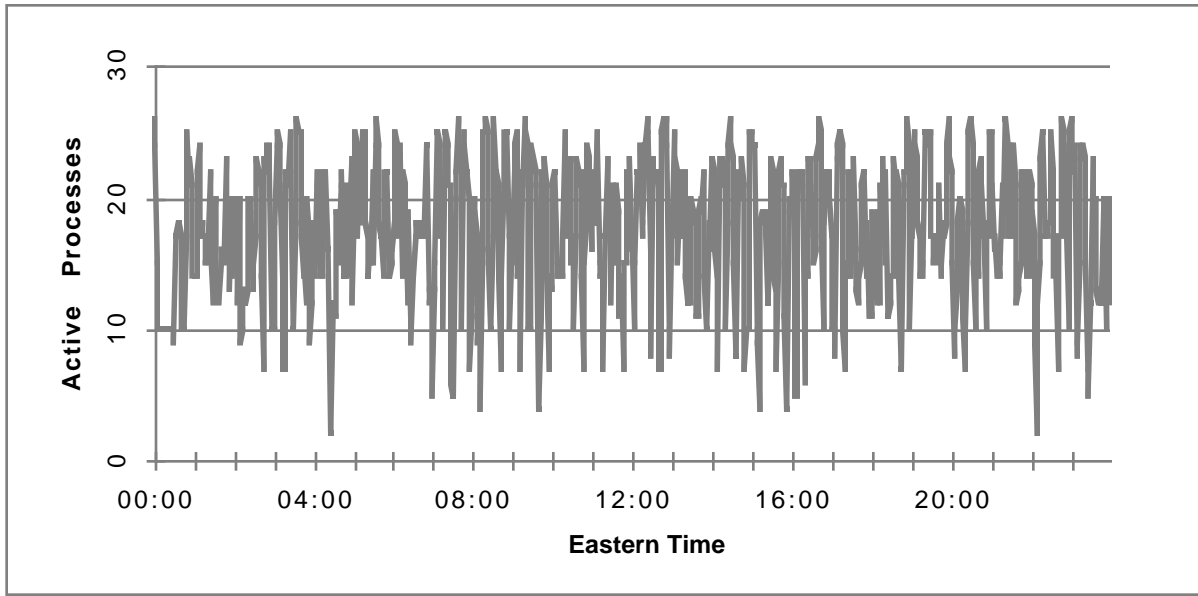


Figure 5.3.3.1-14. EDC Composite Active Processes

5.3.3.2 EDC Archive Operations

The Production Monitor/QA positions monitor the insertion of files into the archive. The figures in this section show the archive writes for activities shown in Table 5.3.3-1.

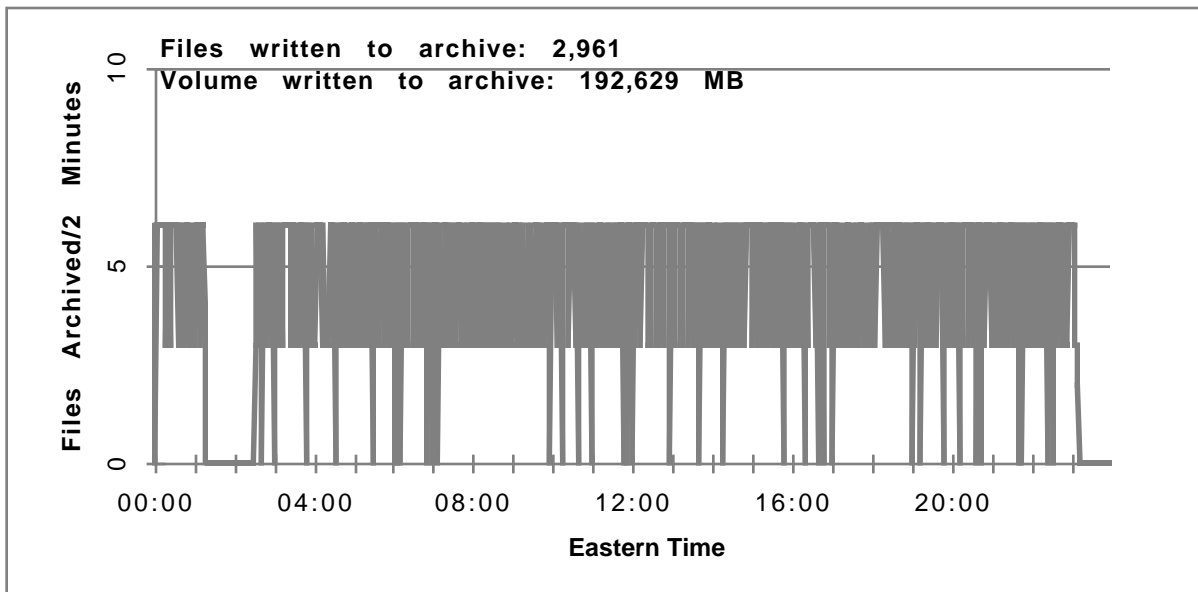


Figure 5.3.3.2-1. EDC AM-1/ASTER/Processing Archive Writes

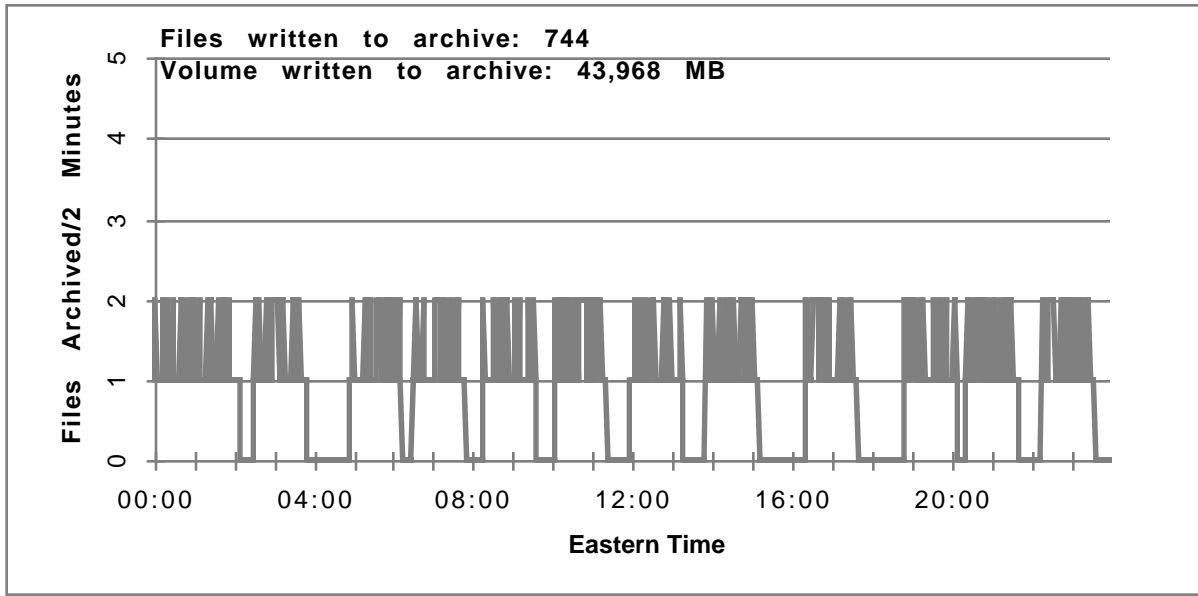


Figure 5.3.3.2-2. EDC AM-1/MODIS/Processing Archive Writes

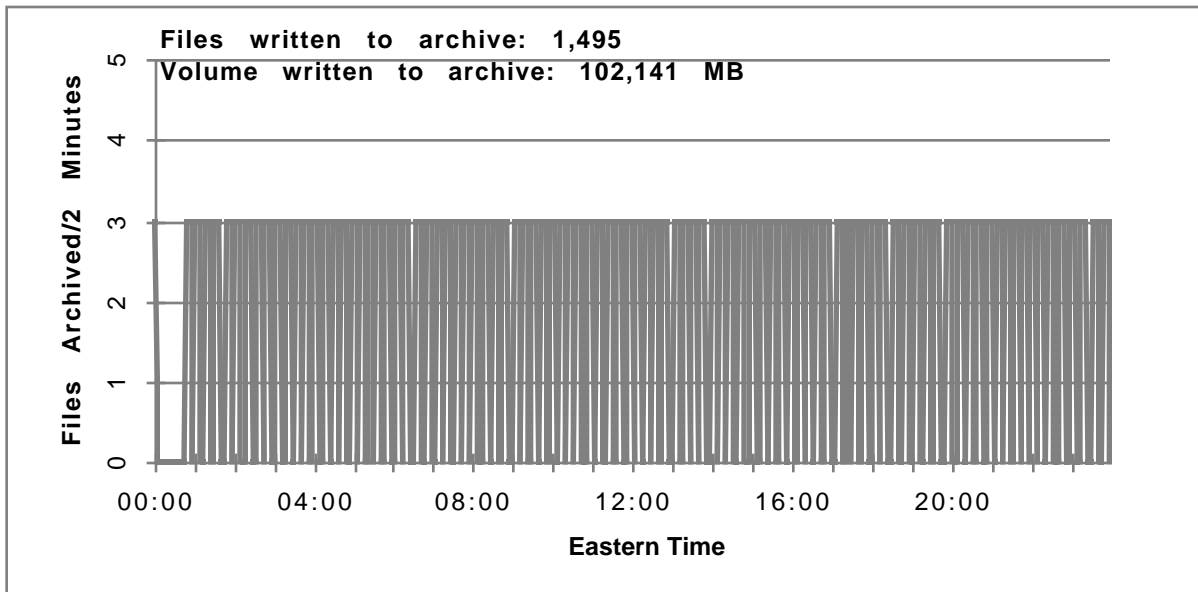


Figure 5.3.3.2-3. EDC AM-1/Subsetting/Processing Archive Write Operations

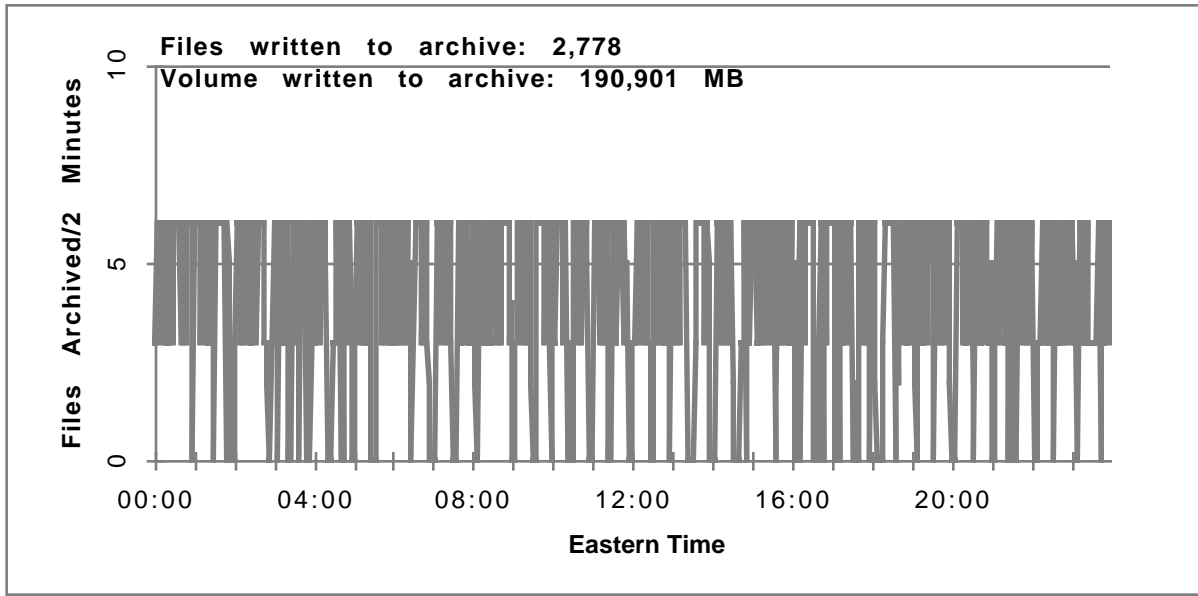


Figure 5.3.3.2-4. EDC AM-1/ASTER/Reprocessing Archive Writes

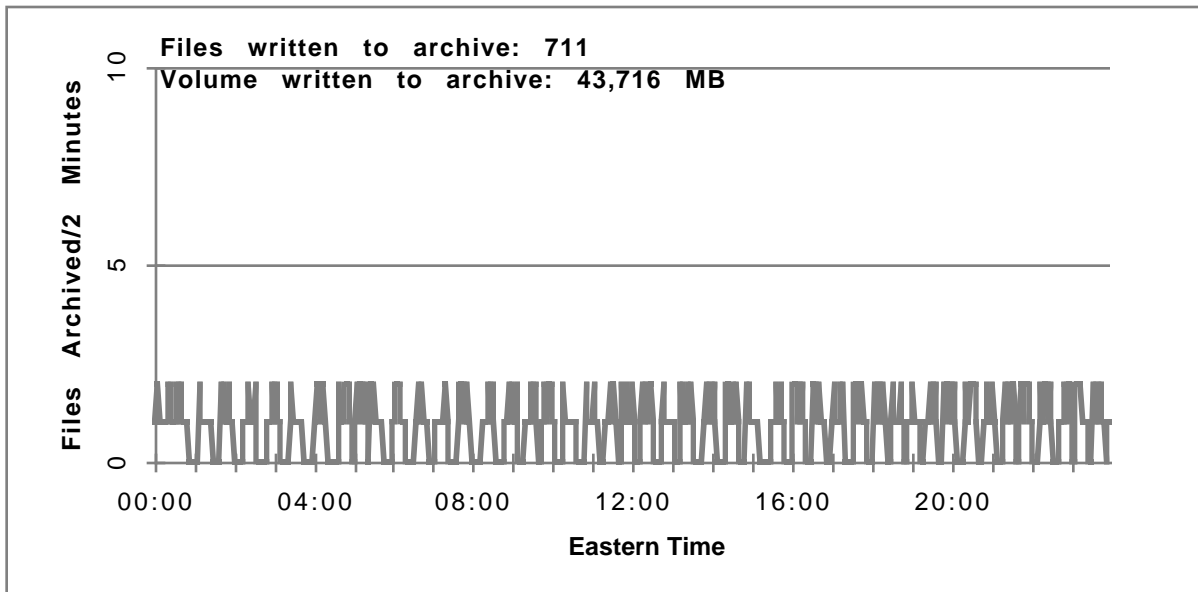


Figure 5.3.3.2-5. EDC AM-1/MODIS/Reprocessing Archive Writes

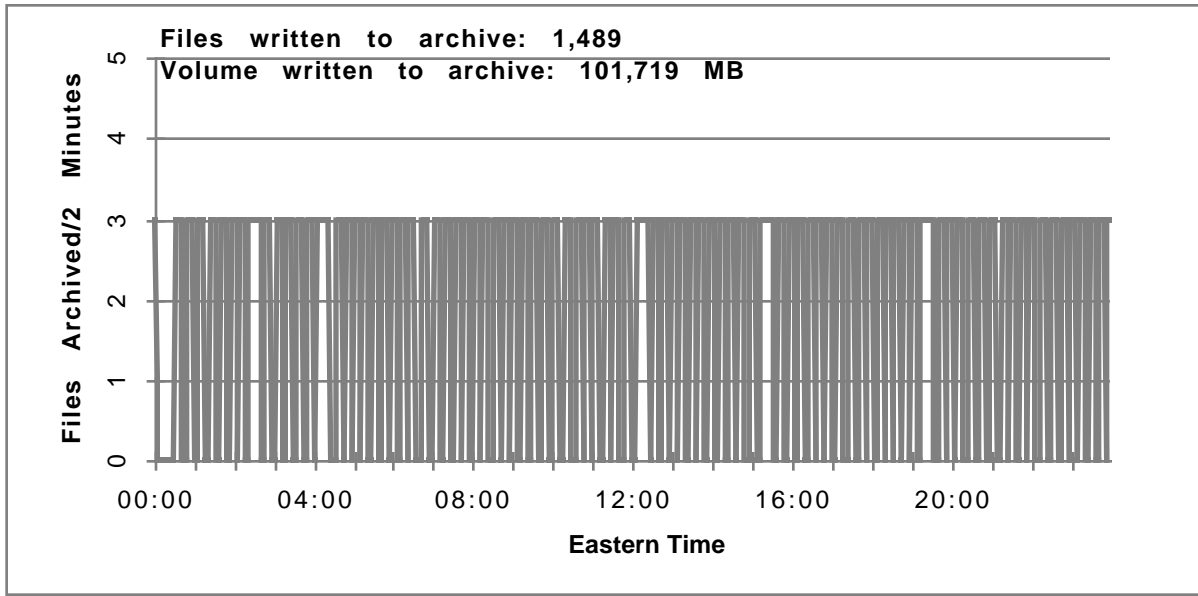


Figure 5.3.3.2-6. EDC AM-1/Subsetting/Reprocessing Archive Writes

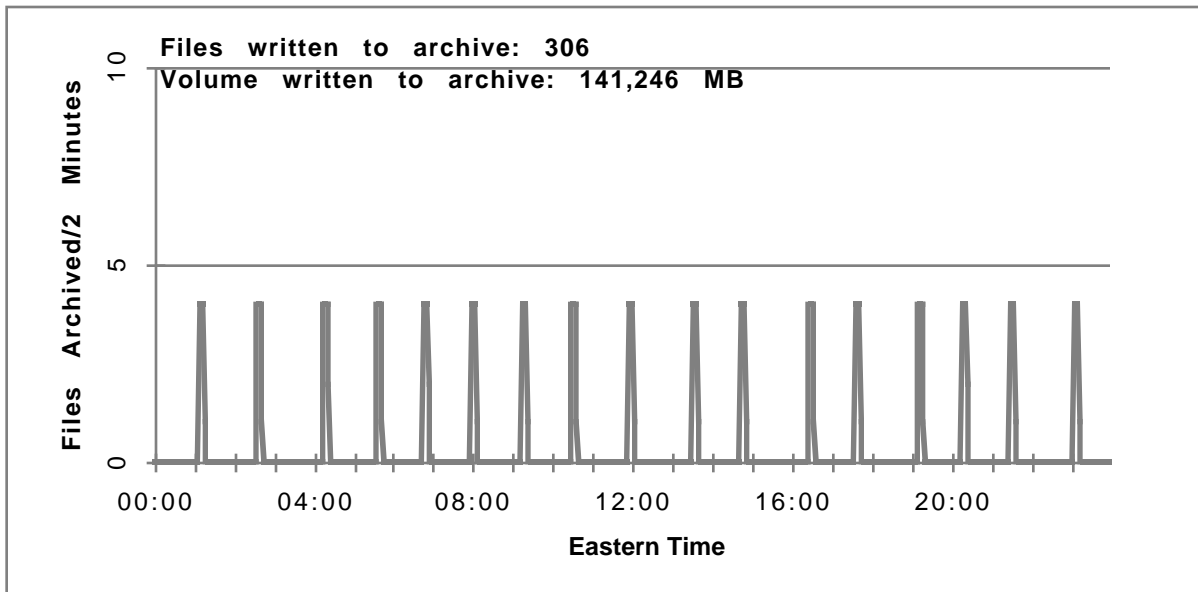


Figure 5.3.3.2-7. EDC Landsat-7/ETM+ Archive Writes

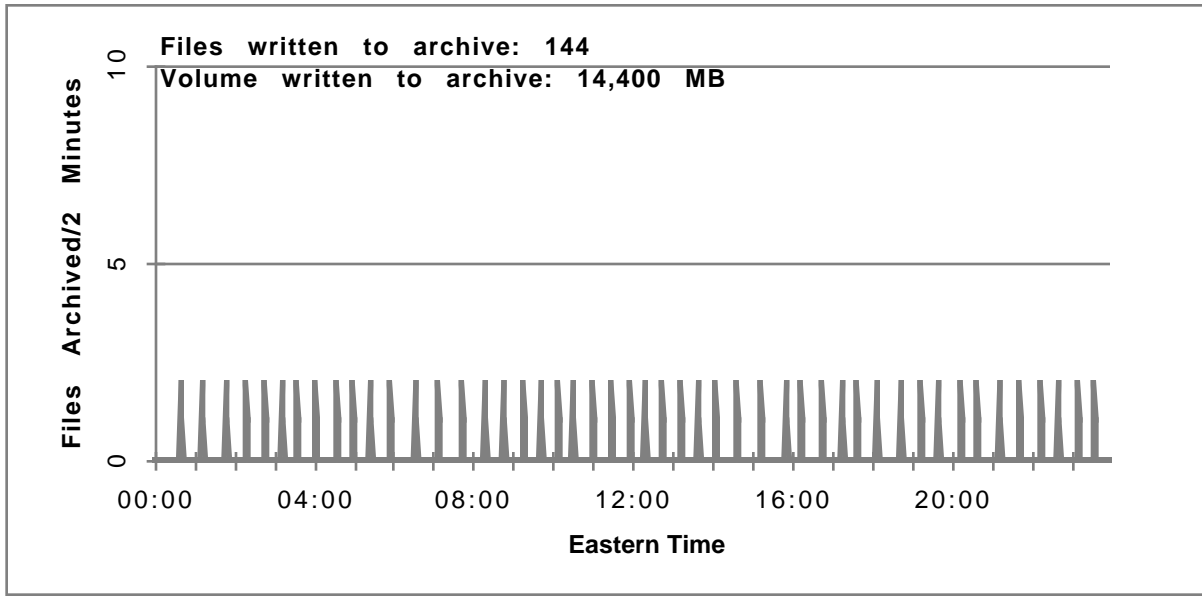


Figure 5.3.3.2-8. EDC V0 Migration Archive Writes

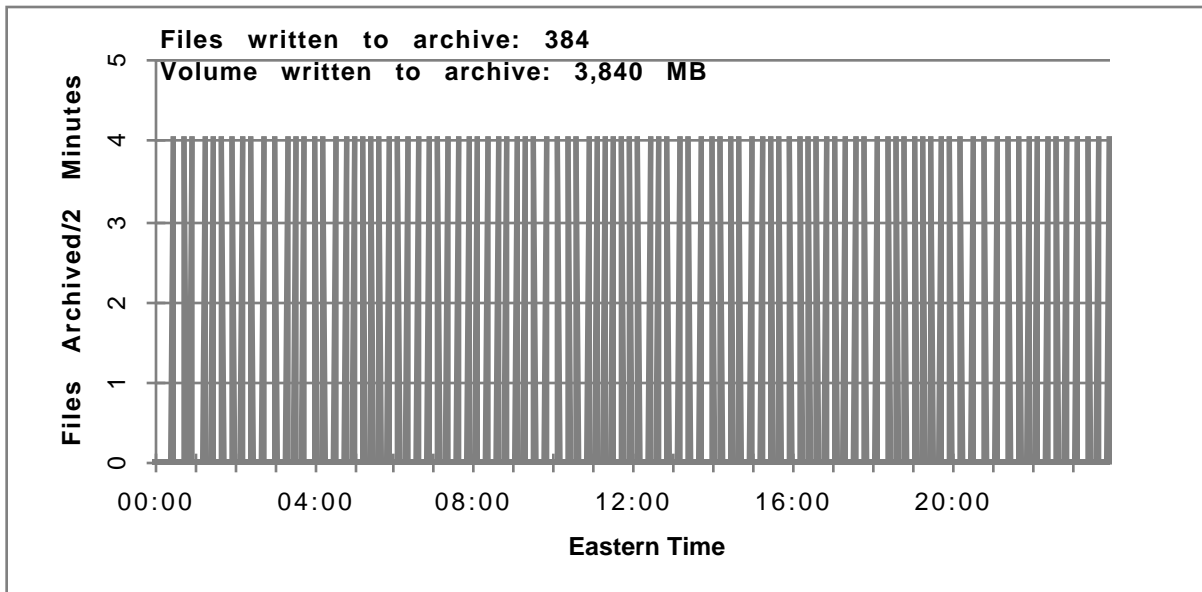


Figure 5.3.3.2-9. EDC Ad Hoc Archive Writes

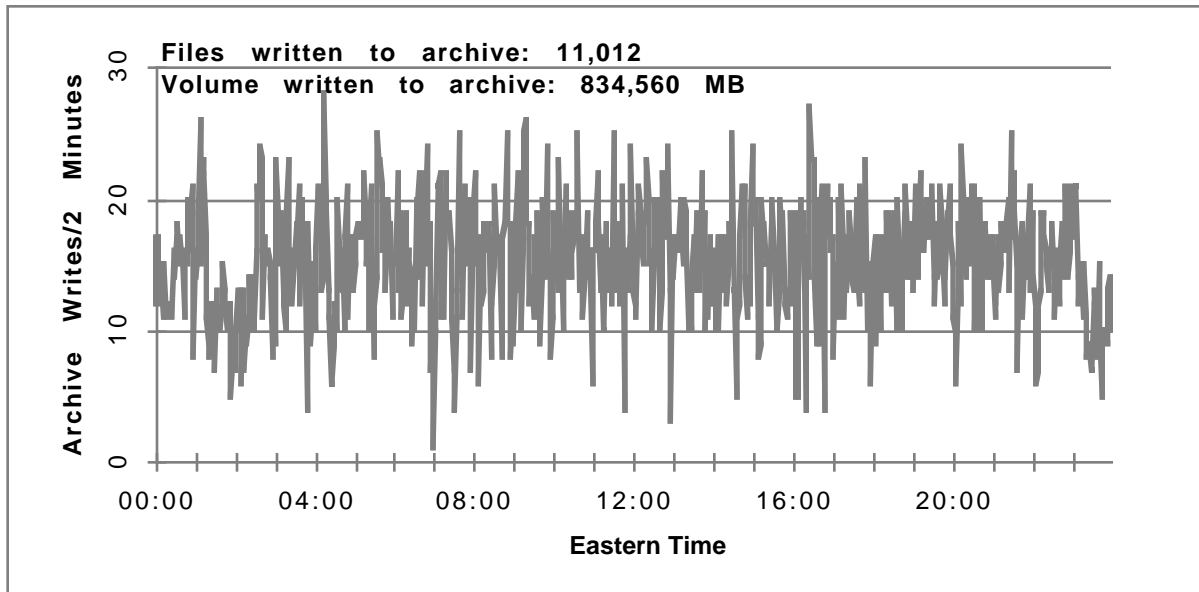


Figure 5.3.3.2-10. EDC Composite Archive Writes

5.3.3.3 EDC Product Distribution Operations

5.3.3.3.1 EDC Hard Media Distribution Operations

Table 5.3.3.3-1 summarizes the key parameters that influence distribution of hard media. The following steps in the creation of a media shipment are assumed:

1. Load media and initialize. The operator prints and applies the media labels, loads the media (either CD or Tape), and initiates writing of the media. It is assumed that any given order is limited to no more than 10 pieces of media. Larger orders are assumed to be segmented into multiple smaller orders.
2. Media creation. Data are written to the media.
3. Unload/reload. After the media are created, the media are unloaded and reloaded into a different device for a quality assurance read check.
4. Media QA. All data written to the media are read and compared to the original data.
5. Package. Media are unloaded, packaged, addressed, etc.

Figure 5.3.3.3-1 shows the day's hard media distribution backlog in terms of orders and media (and how it changed throughout the work day) for all data sets distributed by ECS. Figure 5.3.3.3-2 shows distribution of orders and number of media mapped against order size. Table 5.3.3.3-2 summarizes the day's media creation and distribution activities.

Table 5.3.3.3-1. EDC Hard Media Distribution Parameters

Topic	Assumption
Hours of media distribution	7 days per week, 24 hours per day
Number of media distribution operators	1 per shift*
Touch time assumptions: 1. Load media and initialize 2. Media creation 3. Unload/reload 4. Media QA 5. Packaging	5 min. for 1st piece in an order, 1 min. for each additional piece of media Tape: • 500 KB/sec CD-ROM • 250 KB/sec 5 min. for 1st piece in an order, 1 min. for each additional piece of media See step 2. 10 min. for 1st piece in an order, 2 min. for each additional piece of media
Minimum order size	100 MB
Media volume capacity 1. CD-ROM 2. Tape	2,000 MB 10,000 MB

* May also perform other functions including hard media ingest and/or mail distribution

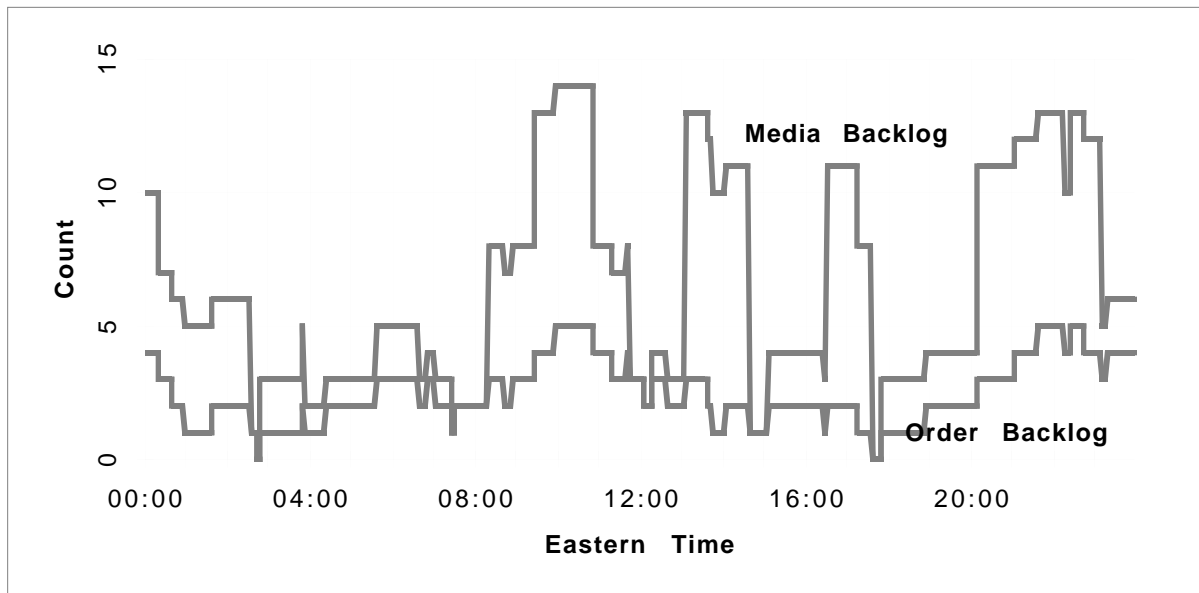


Figure 5.3.3.3-1. EDC Hard Media Distribution Backlog

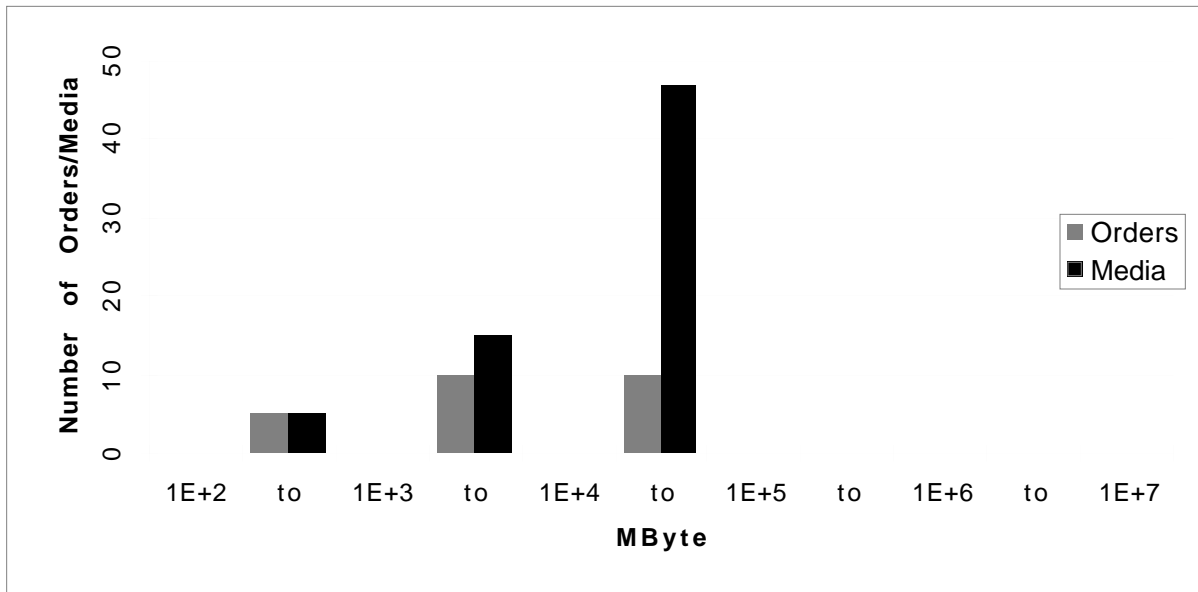


Figure 5.3.3.3-2. EDC Orders and Media by Order Volume

Table 5.3.3.3-2. EDC Media Distribution Summary

Topic	Number of orders	Volume (MB)	Number of media
Start of day in work	4	98,702	13
Start of day backlog	4	87,267	10
Orders received	25	451,440	67
Data distributed	25	342,743	56
End of day in work	4	263,223	28
End of day backlog	4	31,443	6

5.3.3.3.2 EDC Electronic Distribution Operations

Electronic distribution is performed 24 hours/day, 7 days/week. Figure 5.3.3.3-3 shows the day's distribution of user sessions that connect to ECS through the EDC DAAC.

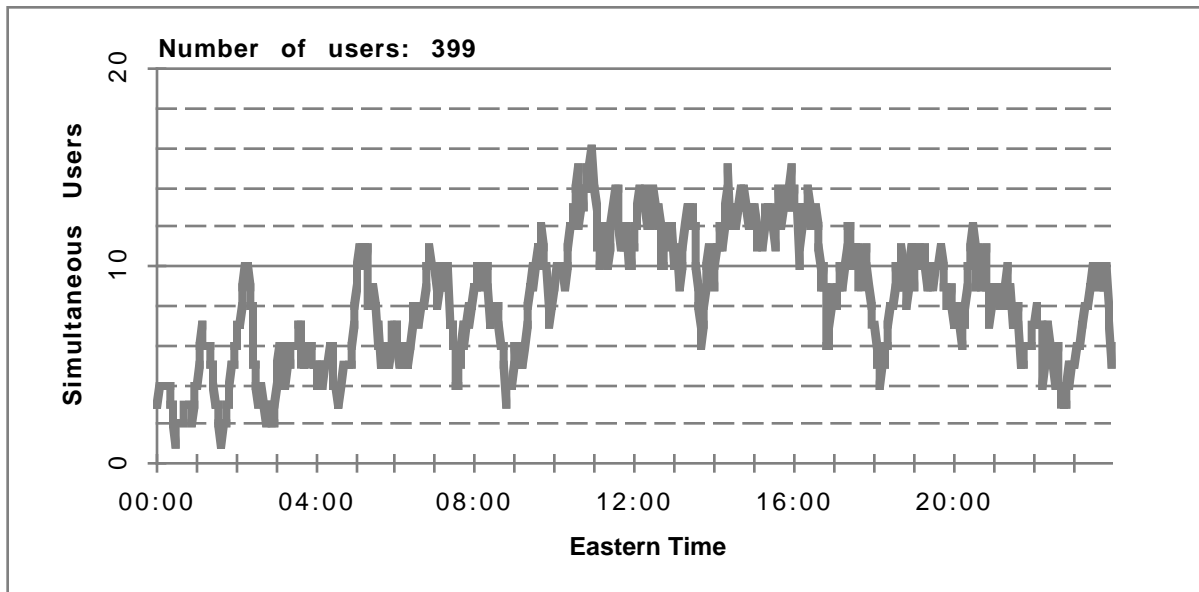


Figure 5.3.3.3-3. EDC User Sessions

5.4 Goddard Space Flight Center (GSFC)

This section describes the activities at the ECS portion of the GSFC DAAC during the operation of ECS Release B.

5.4.1 Key Interfaces: GSFC DAAC-ECS

The GSFC ECS DAAC interfaces with multiple entities external to the DAAC. Figure 5.4.1-1 schematically illustrates the interfaces between the ECS at the GSFC DAAC and its external entities.

The following further describes the external entities, including those identified to support interface testing:

- **GSFC V0 DAAC** - This interface provides access to data or other information that comes into the DAAC via the V0 IMS system but are archived into ECS, or into both ECS and the GSFC V0 archive. The migration of V0 data sets into ECS will occur via this interface.
- **SMC** - This interface provides the capability for the GSFC DAAC to receive configuration data, scheduling directives, policy and procedure information and user registration information. The GSFC DAAC sends its summary fault and performance data, accounting data, resource utilization data, and status reports to SMC.
- **Users** - This interface is the mechanism for user community access to ECS data, products and services.

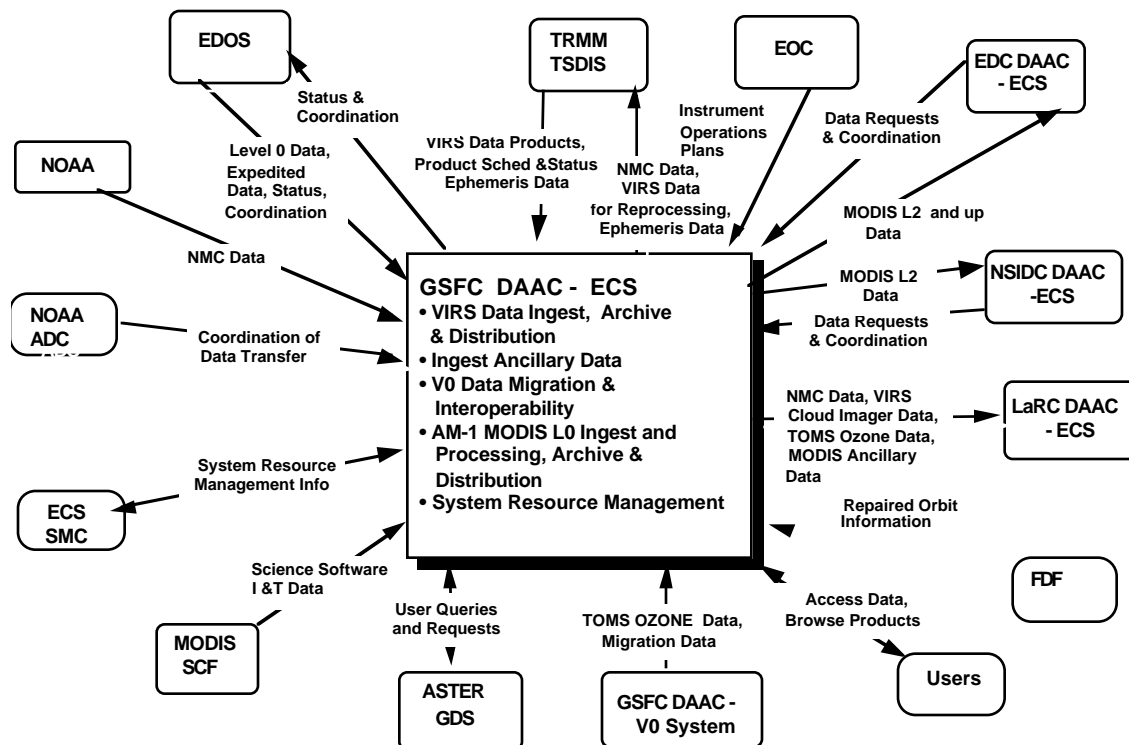


Figure 5.4.1-1. Release B Key Interfaces: GSFC DAAC-ECS

- ASTER GDS - This interface provides GSFC ECS user or ASTER GDS user to view the data holding and order production data from the other system.
- EDC DAAC - This interface allows GSFC DAAC to receive data request and coordination from EDC and transfer MODIS Level 2 and up data to EDC DAAC.
- NSIDC DAAC - This interface allows GSFC DAAC to receive data request and coordination from NSIDC and transfer MODIS Level 2 data to NSIDC DAAC.
- LaRC DAAC - This interface supports the data transfer of ancillary data, including NMC, Cloud Imager, TOMS Ozone, and MODIS data; and VIRS data product from GSFC DAAC to LaRC DAAC.
- TRMM TSDIS - The interfaces between TRMM TSDIS and GSFC ECS DAAC are explained in detail in Section 5.4.2.4 and 5.4.2.5
- SDPF - The science data stream down linked from the EOS TRMM LIS instrument is routed from TRMM SDPF to GSFC ECS DAAC after Level 0 processing. This interface also supports transfer of orbit data for LIS data production.

- EOC - The EOS operation control center (EOC) interfaces with the GSFC DAAC for the exchange of instrument operations plans and schedules for the AM-1 spacecraft and mission historical information.
- Ancillary Source - (NOAA or other ADC) This interface supports access to non-EOS data sets to satisfy ECS user query and to retrieve ancillary data for ECS standard product generation
- NOAA - This interface supports transfer of NMC data to GSFC ECS DAAC.
- LIS SCF - This interface supports the LIS science software integration and testing. LIS algorithms, metadata, science software, test data are example of things that will cross this interface and QA, test results are sent back to LIS SCF.
- MODIS SCF - This interface supports the MODIS Instrument Team. MODIS algorithms, metadata, science software, test data are example of things that will cross this interface and test results are sent back to MODIS SCF.
- EDOS - The science data stream down linked from the EOS AM-1 MODIS instrument is routed from EDOS to GSFC ECS DAAC after processing to Level 0.
- FDF - This interface is required to provide AM-1 satellite refined orbit/attitude data. This data is required for the processing of the EOS AM-1 MODIS data.

5.4.2 GSFC ECS Related Mission and Operations Activities

This section describes the mission and operation activities specific to the ECS portion of the GSFC DAAC during Release B and the retained activities from Release A. The GSFC Products from the Technical Baseline and the GSFC User Pull Baseline during Release B are also included in this section.

5.4.2.1 GSFC Release B

The following is a list of the Release B mission and operations activities for the GSFC DAAC.

- Support operation for TRMM: Archival and access/distribution of TRMM VIRS, PR, TMI, GV data products, provide TSDIS access to ancillary products, support delivery of products to TSDIS for reprocessing, support Ingest/Archive of reprocessed VIRS data
- Support operations for TRMM: Ingest LIS level 0 from SDPF, produce LIS higher level products, archive and access/distribute of LIS data products
- Provide SSM/I & GPCP data from GSFC for use as ancillary product to TSDIS
- Distribute TMI data to LaRC for use in CERES processing
- Support user access of TSDIS products
- Full functionality to support EOS AM-1 science operations: Ingest MODIS L0, produce MODIS higher level products
- Support MODIS algorithm I&T for EOS AM-1
- Backup storage capacity (1 yr) for L0 data MODIS (rolling archive)

- Support access to V0 data products
- Support access/distribution of products
- Support interface for receiving NMC data from DAO

5.4.2.2 GSFC Release A

The following are the Release A mission and operations activities for the GSFC DAAC. Some of this activities will be retained in Release B.

- Support operation for TRMM: Archival and access/distribution of TRMM VIRS data products, provide TSDIS access to ancillary products, support delivery of products to TSDIS for reprocessing, support Ingest/Archive of reprocessed VIRS data
- Support operations for TRMM: Ingest LIS level 0 from SDPF, produce LIS higher level products, archive and access/distribute of LIS data products
- SSM/I data ingest, archive and distribution
- PR/TMI/GV data ingest, archive and distribution
- LIS algorithm updates, integration and test
- MODIS algorithm integration and test
- AM-1 interface test support
- V0 data migration, archive and distribution
- Transition to Release B baseline
- Above activities parallel to V0 operations

5.4.2.3 GSFC Products from Technical Baseline

Table 5.4.2.3-1 provides the products in the ECS Technical Baseline (Based on the AHWGP) which are either produced or archived at the DAAC in Release B.

Table 5.4.2.3-1 GSFC Release B Product Baseline (1 of 2)

Instrument	Platform	Production DAAC	Archival DAAC	Product Level
COLOR	FOO	GSFC	GSFC	1B
COLOR	FOO	GSFC	GSFC	2
COLOR	FOO	GSFC	GSFC	3
MODIS	AM	GSFC	GSFC	1A
MODIS	AM	GSFC	GSFC	1B
MODIS	AM	GSFC	GSFC	2
MODIS	AM	GSFC	EDC	2
MODIS	AM	GSFC	NSIDC	2
MODIS	AM	GSFC	EDC	3

Table 5.4.2.3-1 GSFC Release B Product Baseline (2 of 2)

Instrument	Platform	Production DAAC	Archival DAAC	Product Level
MODIS	AM	GSFC	EDC	4
VIRS	TRMM	TSDIS	GSFC	1A
VIRS	TRMM	TSDIS	GSFC	1B
LIS	TRMM	GSFC	GSFC	1A
LIS	TRMM	GSFC	GSFC	1B
LIS	TRMM	GSFC	GSFC	2
LIS	TRMM	GSFC	GSFC	3
LIS	TRMM	GSFC	GSFC	4
TMI	TRMM	TSDIS	GSFC	1A
TMI	TRMM	TSDIS	GSFC	1B
TMI	TRMM	TSDIS	GSFC	2A
TMI	TRMM	TSDIS	GSFC	3A
PR	TRMM	TSDIS	GSFC	1A
PR	TRMM	TSDIS	GSFC	1B
PR	TRMM	TSDIS	GSFC	1C
PR	TRMM	TSDIS	GSFC	2A
PR	TRMM	TSDIS	GSFC	3A
GV	TRMM	TSDIS	GSFC	1B
GV	TRMM	TSDIS	GSFC	1C
GV	TRMM	TSDIS	GSFC	2A
GV	TRMM	TSDIS	GSFC	3A

5.4.2.4 TRMM: TSDIS to GSFC

A major mission to be supported by GSFC during Release B is TRMM. This section will provide a description of the mission responsibilities of the GSFC DAAC for TRMM.

The GSFC DAAC ingests levels 1A and 1B standard VIRS data products, VIRS combined products, and associated browse data derived from TSDIS processing and reprocessing. ECS archives and distributes these as a service for TSDIS. ECS receives 24 hours of processed data products daily (except level 3 products which are every 5 days), and 2 days worth of reprocessed data products daily during reprocessing periods from TSDIS.

The purpose of this interface is for ECS systems at the GSFC DAAC to ingest TMI and PR level 1A data, levels 1B through 3B of standard and combined science data products derived from TMI and PR Instrument data via TSDIS processing and reprocessing, levels 1B to 3A ground validation (GV) data products derived from 10 ground radar sites, and associated browse products. ECS archives and distributes these data products as a service for TSDIS. ECS receives 24 hours of processed data products daily (except level 3 products, which are made available to

ECS at 5-day and monthly intervals), and 2 days worth of reprocessed data products daily during reprocessing periods, from TSDIS.

Another purpose of this interface is for ECS systems at the GSFC DAAC to ingest metadata for each standard product derived from VIRS data via TSDIS processing and reprocessing. In addition, ECS ingests updated metadata containing new QA flags as needed after product QA. ECS archives and distributes the metadata as a resource for TSDIS. Updated metadata are delivered in batches containing several products at a time. The metadata is included within each product file, and is delivered electronically with the products, with ECS initiating the file transfer.

5.4.2.5 ECS/GSFC to TSDIS Interface

The GSFC DAAC provides TSDIS, through a Data Request, archived levels 1A and 1B VIRS standard and combined processed and reprocessed science data products, for the purpose of TSDIS reprocessing. During reprocessing periods, ECS prepares 2 days worth of the requested archived processed or reprocessed data daily for TSDIS.

The purpose of this interface is for ECS systems at the GSFC DAAC to provide to TSDIS, through a Data Request, archived levels 1A through 3A of TMI, PR, and GV (except level 1A) standard processed and reprocessed science data products, for the purpose of TSDIS reprocessing. During reprocessing periods, ECS prepares 2 days worth of the requested archived processed or reprocessed data daily for TSDIS. The volume of data products provided daily to TSDIS for reprocessing is approximately 9.4 GB per day. The data products are described in the TRMM Science Requirements Document, dated March 30, 1994.

The GSFC DAAC provides to TSDIS, through a standing order, SSM/I Level 1B ancillary data for use in generating processed and reprocessed data products. ECS prepares 1 day of the requested ancillary data for processing, and 2 days for reprocessing, daily for TSDIS.

The GSFC DAAC provides TSDIS, through a standing order, the Final Analysis and Forecast System, Global Analysis (FNL) NMC Gridded Data Product (TBR) for use in generating data products. ECS prepares 1 day of the requested ancillary data for processing and 2 days for reprocessing daily for TSDIS.

5.4.2.6 DAO

The GSFC DAAC will operate and maintain the Data Assimilation System (DAS) of the DAO. The DAS will require as input NMC observational data and a selected set of data from EOS instruments. It is anticipated that the DAS use of EOS instrument data will increase with time. These input data will be made available to the DAS on the ECS data server.

The operational global gridded assimilation products produced by the DAS will be stored and made available to users on the ECS data server also. The technical baseline document for the ECS project contains a complete catalog of the DAS products. The operational products of the DAS are of two types. First look analysis products are produced in a real-time mode using NMC data as input. Final analysis products are produced when a complete set of input data is available and will be the definitive operational assimilation products.

The DAS will also run periodic Reanalysis jobs, which are the production of long term historical analyses for purposes of scientific research. Finally DAO research and development will also take place on the DAS at the GSFC DAAC.

5.4.2.7 MODIS

ECS provides ground support for EOS AM-1 spacecraft and instrument mission operations. This support includes mission planning, scheduling, control, monitoring, and analysis for the AM-1 spacecraft and its instruments. The AM-1 payload complement consists of five instruments: ASTER, CERES, MISR, MODIS, and MOPITT. ASTER and MODIS are Facility Instruments on AM-1 and are coordinated by Team Leads (TL) for their operations. MODIS TL is located in GSFC.

EDOS is the EOSDIS component that supports real time and Level 0 data delivery operations for the EOS spacecraft. EDOS performs MODIS Level 0 data production, quick look processing, Level 0 Production Data Set distribution, Quick Look Data Set distribution, and backup data archive service.

5.4.2.8 GSFC User Pull Baseline

Table 5.4.2.8-1 lists the Data Volumes and Usage Estimates for the GSFC DAAC. See section 5.1.2 for a description of how the data was developed and definition of each of the parameters.

Table 5.4.2.8-1. GSFC Data Volumes and Usage Estimates

	1-Apr-97		1-Apr-98		1-Apr-99		1-July-99		1-Jan-00	
	Low	High	Low	High	Low	High	Low	High	Low	High
Archive Vol (TB)	3.374	3.374	14.632	14.632	138.039	138.039	174.825	174.825	252.604	252.604
Distrib. Vol/yr (TB)	6.748	6.748	22.515	22.515	246.816	246.816	316.620	316.620	314.842	314.842
GB/day produced/migrated	36.97	36.97	54.61	54.61	432.37	432.37	424.68	424.68	428.28	428.68
#Users/yr	400	700	2000	3700	2500	5100	2600	5000	2600	5500
#DAAC Accesses/yr	4000	14000	20000	74000	25000	102000	26000	100000	26000	110000

5.4.3 Day in the Life of ECS at the GSFC DAAC

Activities described in this section occurred on Wednesday, 01-Sep-99, during Epoch “k.” This section provides a retrospective look at the operational activities of the day. That is, it is the “as executed” data for the day. Activities (and their key metrics) performed with ECS resources at the DAAC are shown in Table 5.4.3-1. Note that these are daily averages for Epoch k. Data for this day may vary from the average. Figure 5.4.3-1 shows a composite summary of these activities.

Figures 5.4.3-2 through 5.4.3-8 show Release B and Release C activities leading up to and during this period. Activities related to Releases C & D missions have not been defined. Some non-operational activities may have an impact on operations by reassigning resources from operations

to test. However, this “Day in the Life” material assumes there were no impacts from these activities to ingest, production, archive and data distribution operations.

Table 5.4.3-1. Activities in the Day in the Life of ECS at GSFC (1 of 2)

Activity	Description	Metrics (daily average)
ECS production planning	<u>Processing</u> <ul style="list-style-type: none"> • TRMM/LIS • DAO/DAS • AM1/MODIS • AM1/Subsetting* • FOO/COLOR <u>Reprocessing</u> <ul style="list-style-type: none"> • TRMM/LIS • AM1/MODIS • AM1/Subsetting* • FOO/COLOR 	<u>Number of processes</u> <ul style="list-style-type: none"> 2 2 12,818 6,510 69 2 12,818 6,510 69
ECS ingest	<u>Processing</u> <ul style="list-style-type: none"> • TRMM/GV • TRMM/PR • TRMM/TMI • TRMM/VIRS • TRMM/LIS • AM1/MODIS • FOO/COLOR <u>Reprocessing***</u> <ul style="list-style-type: none"> • TRMM/GV • TRMM/PR • TRMM/TMI • TRMM/VIRS • TRMM/LIS**** • AM1/MODIS • FOO/COLOR <u>Other</u> <ul style="list-style-type: none"> • Migrated V0 data • Ad Hoc data** 	<u>Ingests per day</u> <ul style="list-style-type: none"> 1 from SDPF 1 from SDPF 1 from SDPF 1 from SDPF 1 from TSDIS 12 from EDOS 12 from TBD 1 from SDPF 1 from SDPF 1 from SDPF 1 from SDPF 1 from archive 48 from archive 48 from archive 48 from V0 migration system 96 from miscellaneous sources
ECS product generation	<u>Processing</u> <ul style="list-style-type: none"> • TRMM/LIS • DAO/DAS • AM1/MODIS • AM1/Subsetting* • FOO/COLOR <u>Reprocessing</u> <ul style="list-style-type: none"> • TRMM/LIS • AM1/MODIS • AM1/Subsetting* • FOO/COLOR 	<u>Hours of product generation</u> <ul style="list-style-type: none"> 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day

Table 5.4.3-1. Activities in the Day in the Life of ECS at GSFC (2 of 2)

Activity	Description	Metrics (daily average)	
ECS archive	Processing	<u># of Files</u>	<u>Vol. (MB)</u>
	• TRMM/GV	6	4,815
	• TRMM/PR	8	8,358
	• TRMM/TMI	5	2,608
	• TRMM/VIRS	3	1,898
	• TRMM/LIS	19	1,626
	• DAO/DAS	10	28,854
	• AM1/MODIS	8,375	354,095
	• AM1/Subsetting*	585	12,800
	• FOO/COLOR	165	10,247
	Reprocessing		
	• TRMM/GV	6	4,815
	• TRMM/PR	8	8,358
	• TRMM/TMI	5	2,608
	• TRMM/VIRS	3	1,898
	• TRMM/LIS	19	1,626
	• AM1/MODIS	8,375	354,095
	• AM1/Subsetting*	585	12,800
	• FOO/COLOR	165	10,247
	Other		
	• Migrated V0 data	133	13,272
	• Ad hoc data**	230	2,300
ECS electronic data distribution through ECS client or web	• User pull • Number of user accesses per day	Available 7 days/week, 24 hours/day 282	
ECS hard media data distribution	• Distribution of hard media	<u>Vol. (MB)</u> 425,301	<u># of Orders</u> 25
ECS user services	• Staffed hours	5 days/week, 8 hours/day	
ECS operations	<u>Science data production</u>		
	• Staffed hours	7 days/week, 24 hours/day	
	<u>Other operations</u>		
	• Staffed hours	7 days/week, 24 hours/day	
ECS engineering	• Staffed hours	5 days/week, 8 hours/day	

* Subsetting includes those processes and files described as subsetting of various MODIS products. An equivalent processing and archive load for subsetting of reprocessed MODIS data is also assumed.

** “Ad Hoc” data are used as a place holder for any miscellaneous files that are archived. Examples include files ingested from hard media or electronically from users/SCFs.

*** “Ingest from archive” means that the data being reprocessed is being pulled from the ECS archive.

**** Because the number of processes is small, a single ingest and execution sequence per day is assumed.

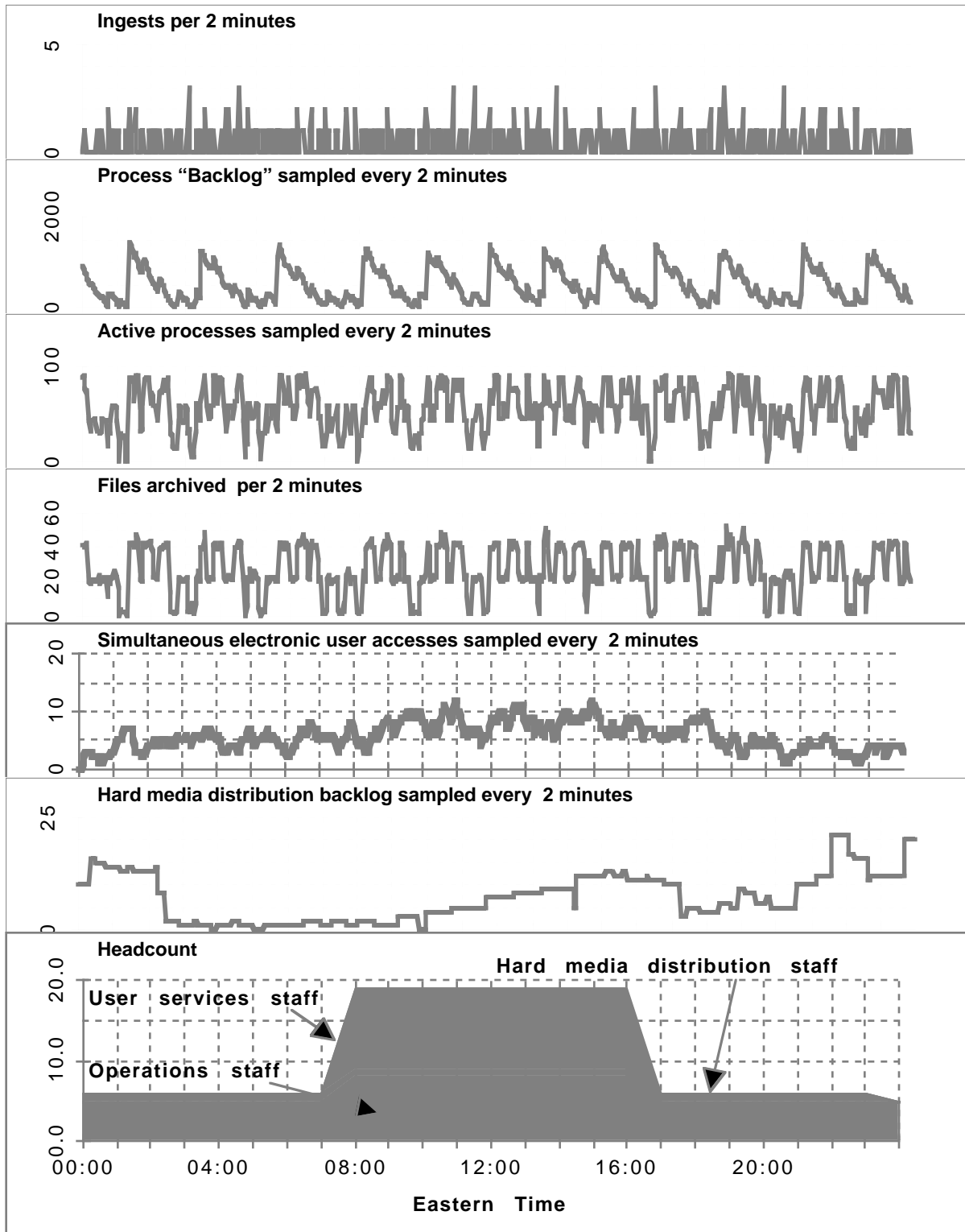


Figure 5.4.3-1. Overview of Day in the Life of ECS at GSFC

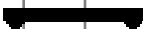






Name	1994	1995	1996	1997	1998	1999	2000
B: ECS development milestones			11/1			9/30	
B: HW installations			11/1		6/11		
B: Consent to ship Review			6/1				
B: Site acceptance testing			6/1		9/4		
B: Release Readiness Review			9/1				
B: Site HW capacity upgrades				5/1		7/30	
B: Site capacity upgrades testing				8/1		9/30	

Figure 5.4.3-2. GSFC Related Release B Development Milestones





Name	1994	1995	1996	1997	1998	1999	2000
B: Science SW			10/8		2/17		
B: AM-1 MODIS mission version SW I&T			10/8		11/5		
B: AM-1 MODIS science SW testing			11/6		12/3		
B: FOO/COLOR mission integration support			11/6		12/4		

Figure 5.4.3-3. GSFC Science SW Activities












Name	1994	1995	1996	1997	1998	1999	2000
B: System integration				9/3 	2/13		
B: V0 interoperability				10/6 	12/5		
B: IV&V				9/3 	11/20		
B: IV&V: GSFC testing				9/24 	10/7		
B: I/F integration and test				11/21 	2/13		
B: System integration				11/21 	2/13		
B: SCF - ECS integration				11/21 	12/17		
B: DAAC - DAAC integration				11/21 	12/17		
B: ETS - ECS integration				12/18 	1/1		
B: EDOS-EBNET-ECS integration				1/2 	2/5		
B: ECS-ancillary data integration				2/6 	2/13		

Figure 5.4.3-4. GSFC System Integration Activities











Name	1994	1995	1996	1997	1998	1999	2000
B: Mission Readiness				3/3 	6/30		
B: AM-1 S/C end to end				3/3 	3/9		
B: AM-1 mission ops simulation				3/30 	4/3		
B: AM-1 operational readiness exercises				4/6 	6/30		
B: Training and certification				6/1 	1/15		
B: Operator training (classroom, IATO, IV&V, OJT, etc.)				6/1 	5/27		
B: Operator certification				5/27 			
B: Mission certification				2/17 	3/2		
B: AM-1 Landsat-7 EOSDIS Version 2 Baseline Test				2/17 	3/2		
B: ECS Version 2 Baseline Certification				2/17 	3/2		

Figure 5.4.3-5. GSFC Mission Readiness, and Training and Certification Activities







Name	1994	1995	1996	1997	1998	1999	2000
B: Mission Readiness				3/3		6/30	
B: AM-1 S/C end to end				3/3	3/9		
B: AM-1 mission ops simulation				3/30	4/3		
B: AM-1 operational readiness exercises				4/6		6/30	
B: Training and certification			6/1			1/15	
B: Operator training (classroom, IATO, IV&V, OJT, etc.)			6/1		5/27		
B: Operator certification				5/27			
B: Mission certification				2/17		3/2	
B: AM-1 Landsat-7 EOSDIS Version 2 Baseline Test				2/17	3/2		
B: ECS Version 2 Baseline Certification				2/17	3/2		

Figure 5.4.3-6. GSFC Mission Operations Activities






Name	1994	1995	1996	1997	1998	1999	2000
B: ECS maintenance and sustaining engineering			9/1				3/3
B: Operations readiness and performance assurance			9/1				3/3
B: Sustaining engineering			9/1				3/3
B: Property management, HW maintenance and ILS			9/1				3/3
B: Resource planning and performance analysis			9/1				3/3

Figure 5.4.3-7. GSFC Maintenance and Sustaining Engineering Activities






Name	1994	1995	1996	1997	1998	1999	2000
B: ECS maintenance and sustaining engineering			9/1				3/3
B: Operations readiness and performance assurance			9/1				3/3
B: Sustaining engineering			9/1				3/3
B: Property management, HW maintenance and ILS			9/1				3/3
B: Resource planning and performance analysis			9/1				3/3

Figure 5.4.3-8. GSFC Related Release C Development Milestones

5.4.3.1 GSFC Production Activities

This section provides an end of day view of processing and reprocessing of TRMM/LIS, AM1/MODIS, AM1/Subsetting, and FOO/COLOR products. Two sets of data are shown for the processing and reprocessing production:

- **Process Backlog.** A process goes into a “backlog” state when data is ingested and its processing can be scheduled as a result of that ingest. For example, TRMM/LIS data is ingested once a day. The model assumes that all processes go into a “backlog” state at that time. A process may be one or more PGEs.
- **Active Processes.** The model assumes that two strings are available for use. The average time required for a process to complete is determined by dividing the number of processes executed in a day by the number of hours of production. The model assumes that each string can execute one or more processes in the two minute time step. The model also assumes that excess capacity is available and each process completes faster than the average as described below:
 - One third faster for AM1/MODIS, AM1/Subsetting and DAO/DAS.
 - Ten times faster for TRMM/LIS and FOO/COLOR.

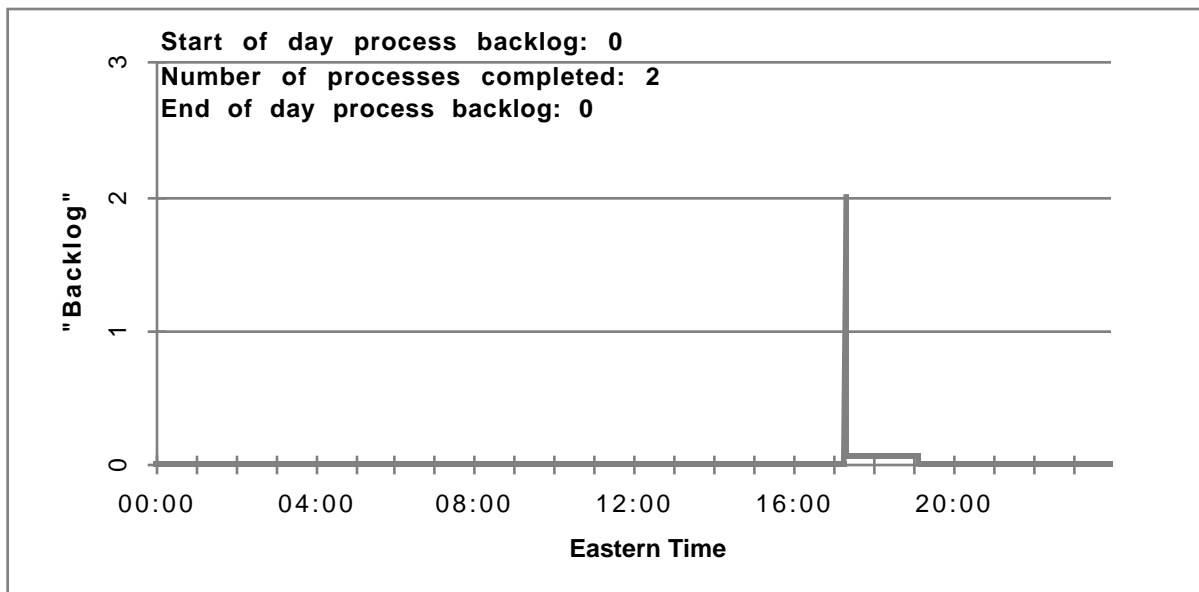


Figure 5.4.3.1-1. GSFC TRMM/LIS/Processing Process Backlog

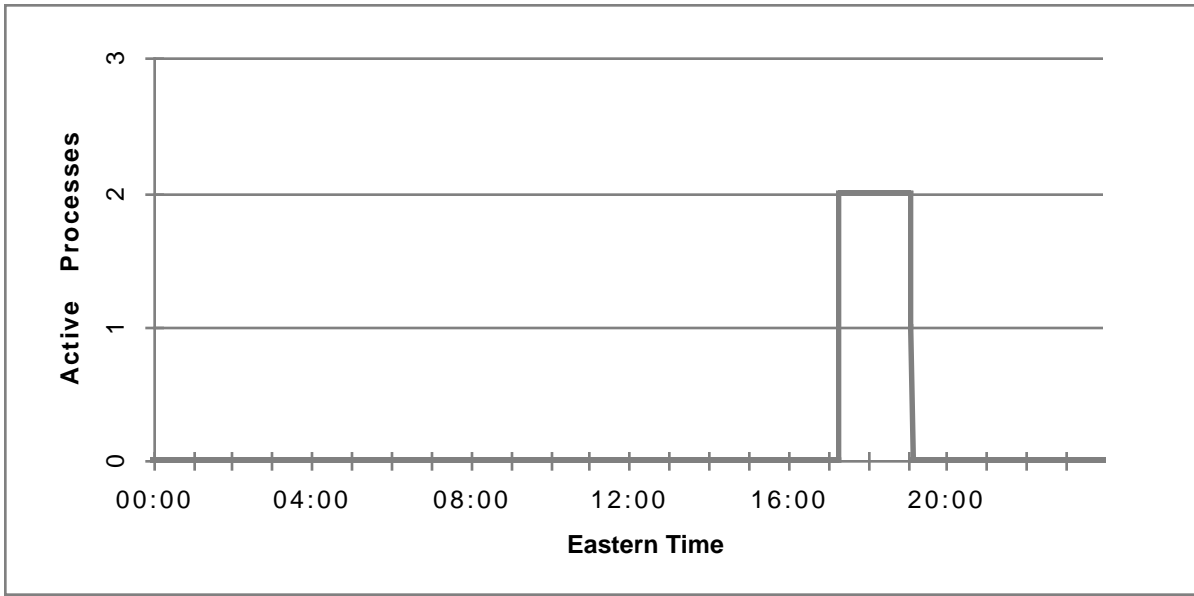


Figure 5.4.3.1-2. GSFC TRMM/LIS/Processing Active Processes

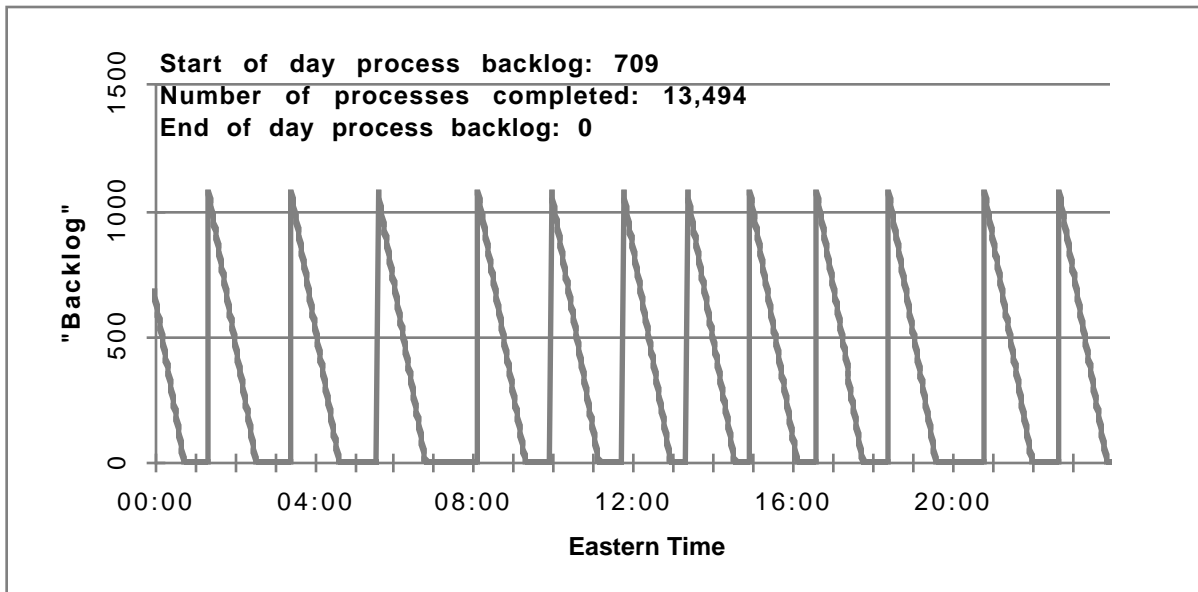


Figure 5.4.3.1-3. GSFC AM-1/MODIS/Processing Process Backlog

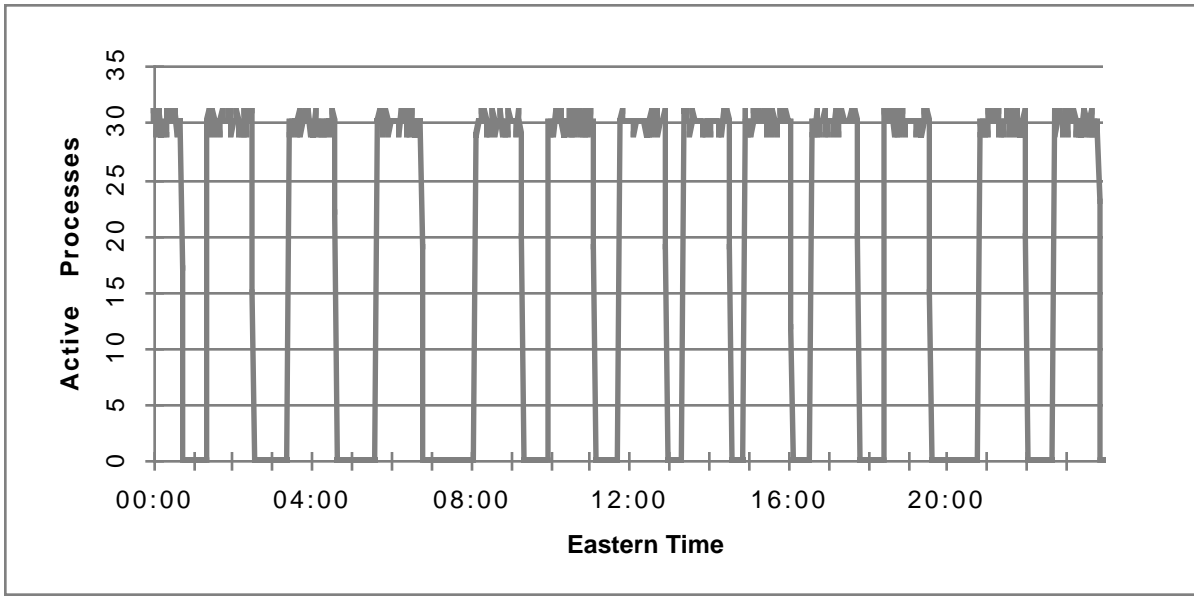


Figure 5.4.3.1-4. GSFC AM-1/MODIS/Processing Active Processes

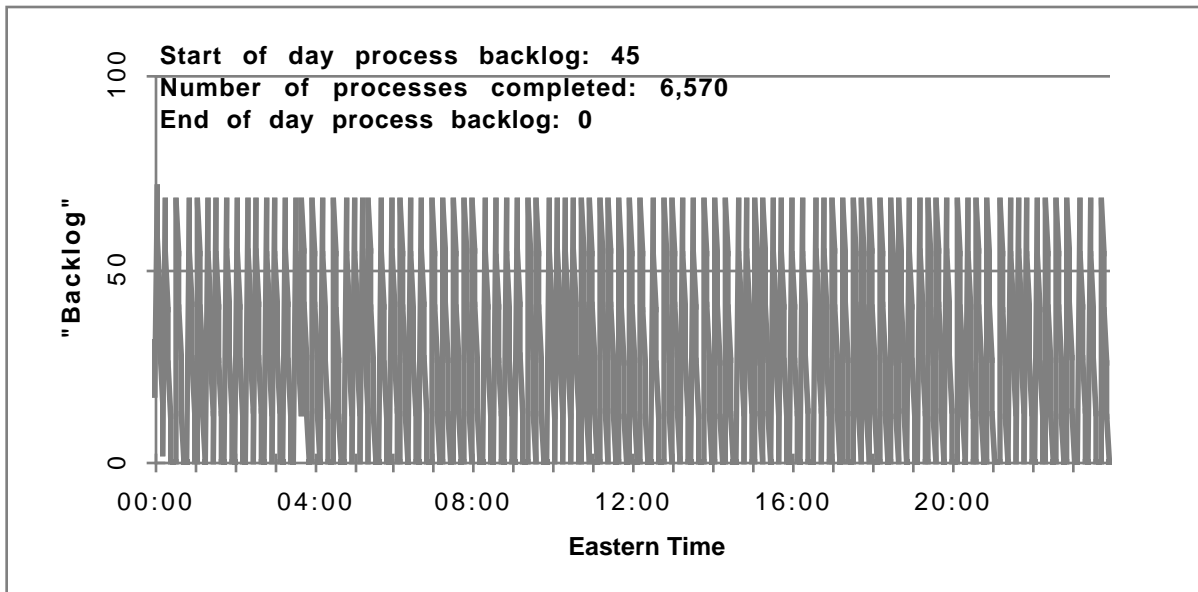


Figure 5.4.3.1-5. GSFC AM-1/Subsetting/Processing Process Backlog

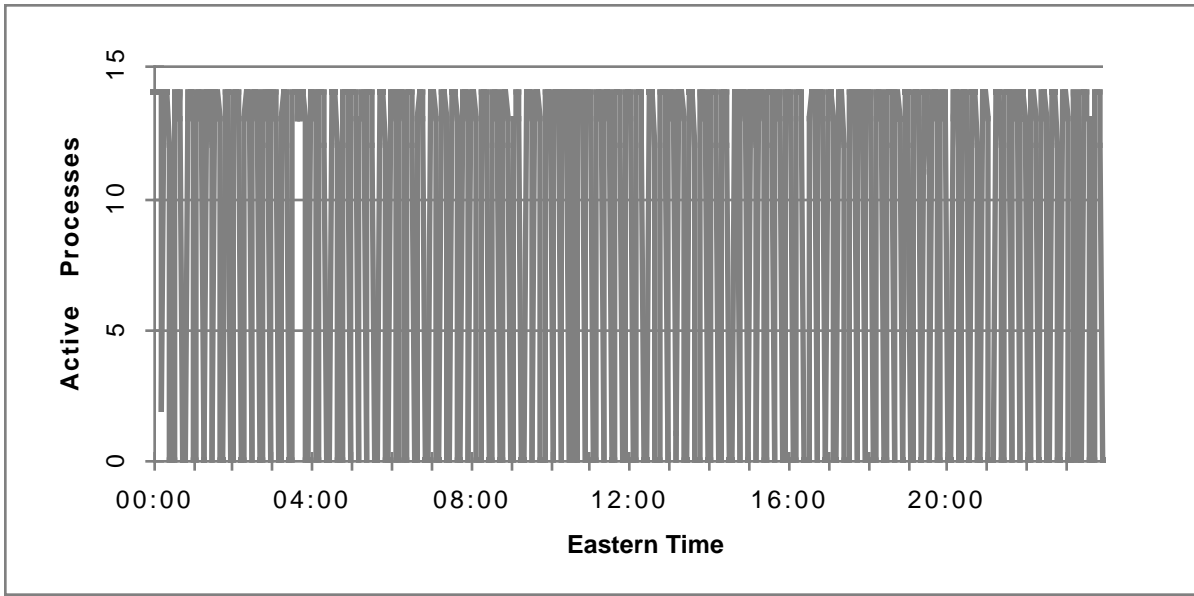


Figure 5.4.3.1-6. GSFC AM-1/Subsetting/Processing Active Processes

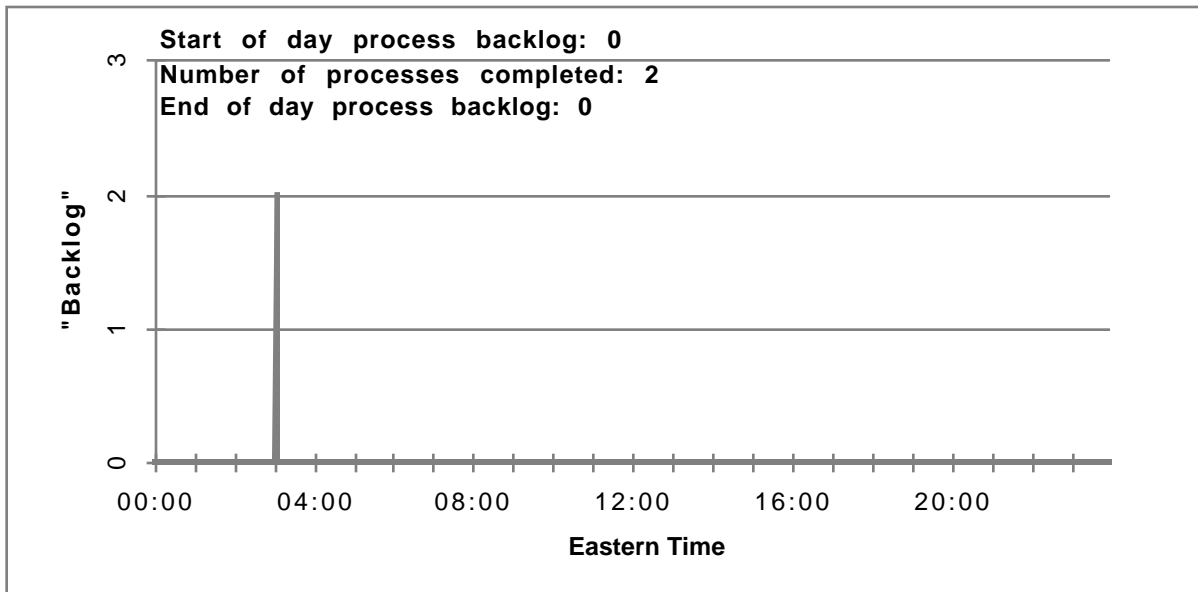


Figure 5.4.3.1-7. GSFC AM-1/DAO/DAS/Processing Process Backlog

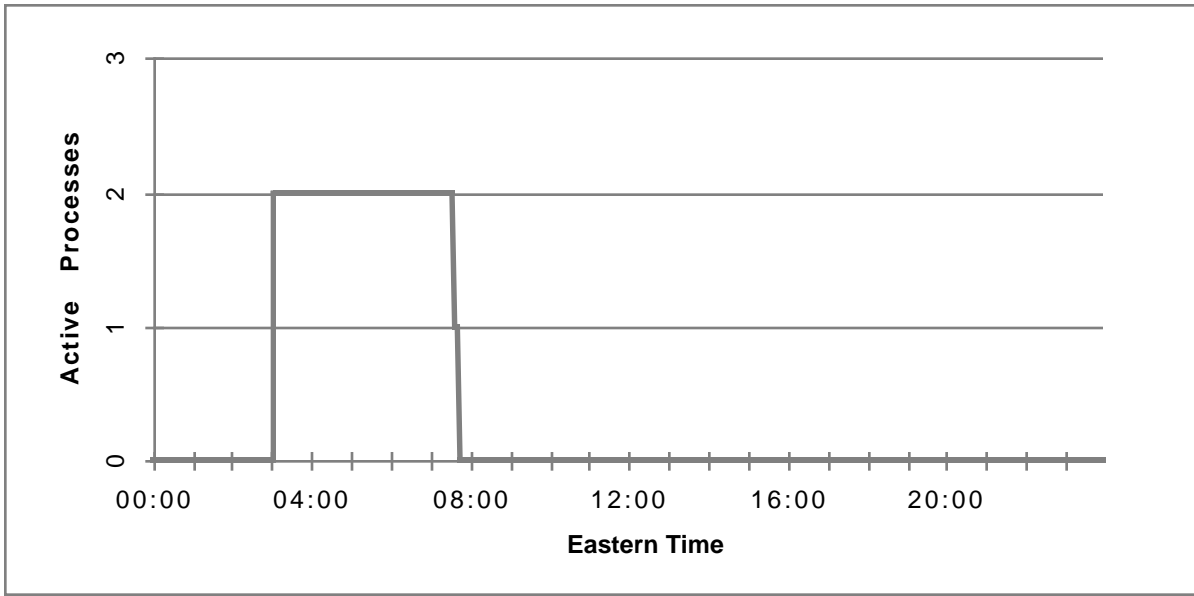


Figure 5.4.3.1-8. GSFC AM-1/DAO/DAS/Processing Active Processes

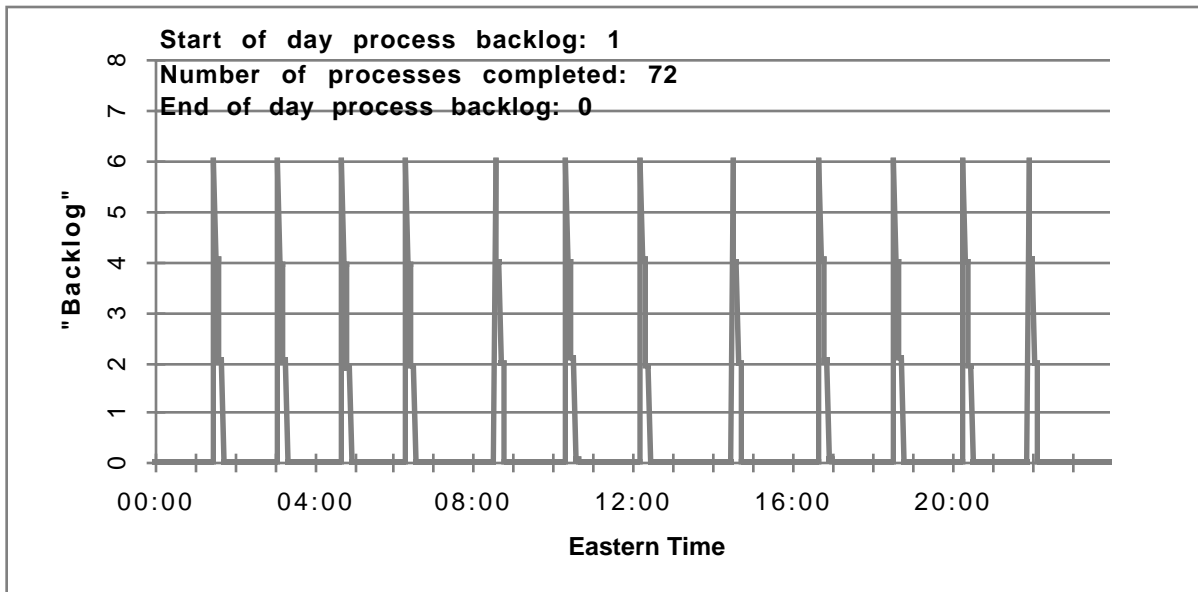


Figure 5.4.3.1-9. GSFC FOO/COLOR/Processing Process Backlog

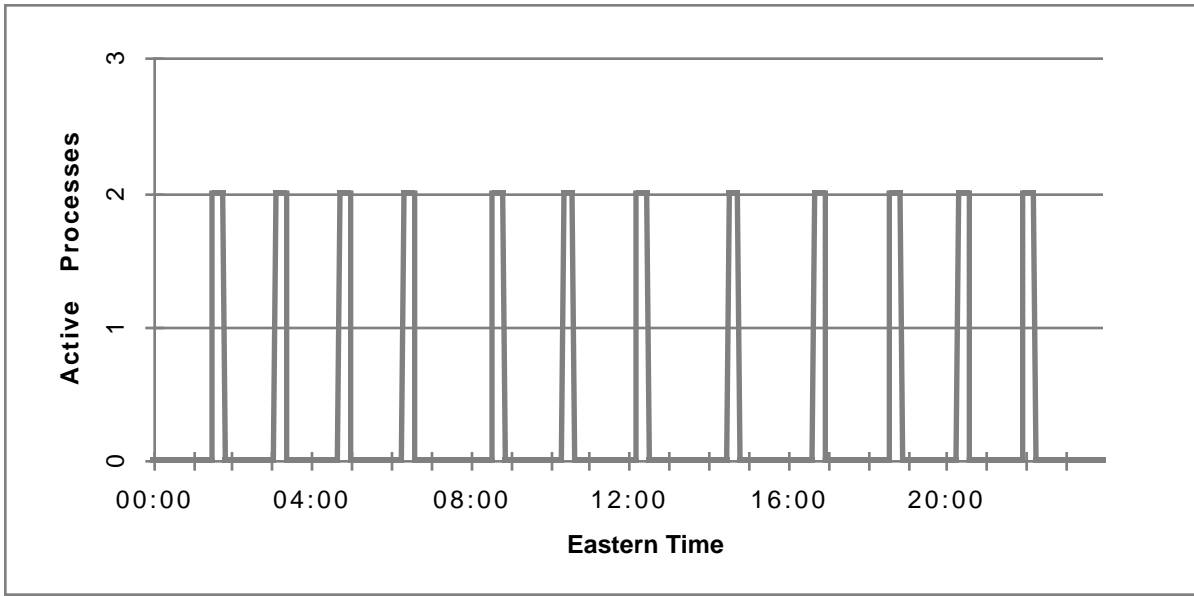


Figure 5.4.3.1-10. GSFC FOO/COLOR/Processing Active Processes

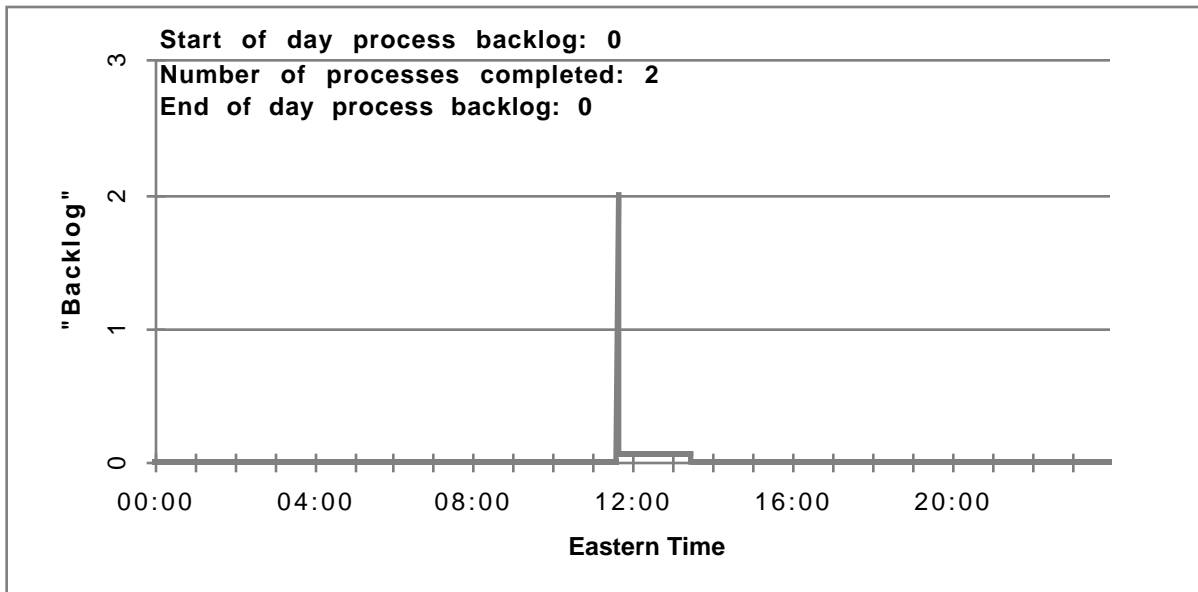


Figure 5.4.3.1-11. GSFC TRMM/LIS/Reprocessing Process Backlog

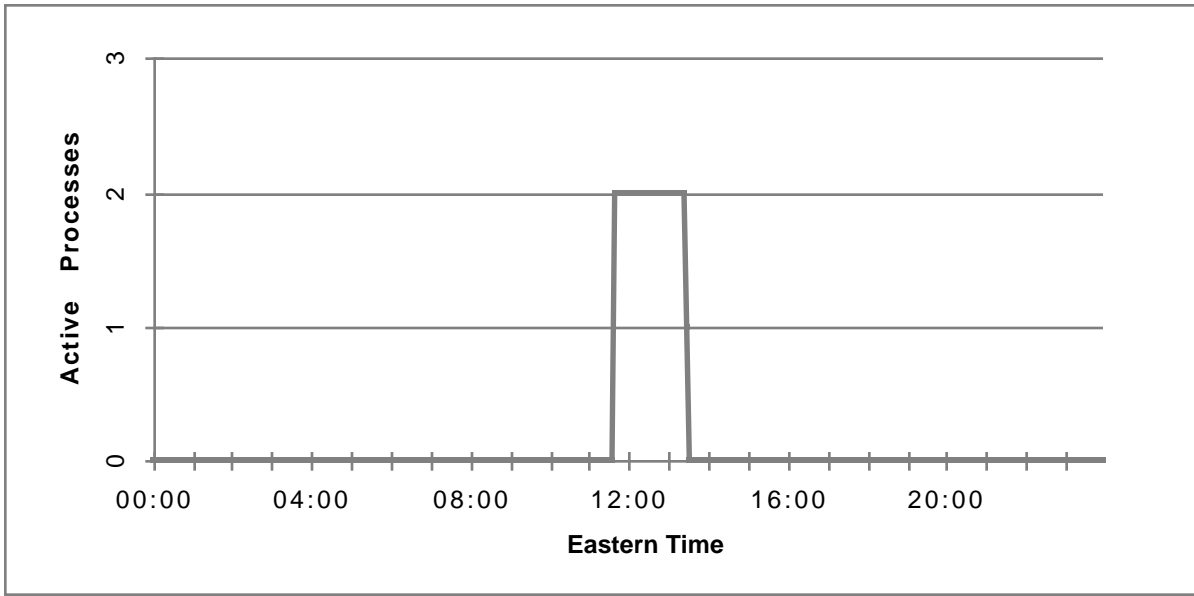


Figure 5.4.3.1-12. GSFC TRMM/LIS/Reprocessing Active Processes

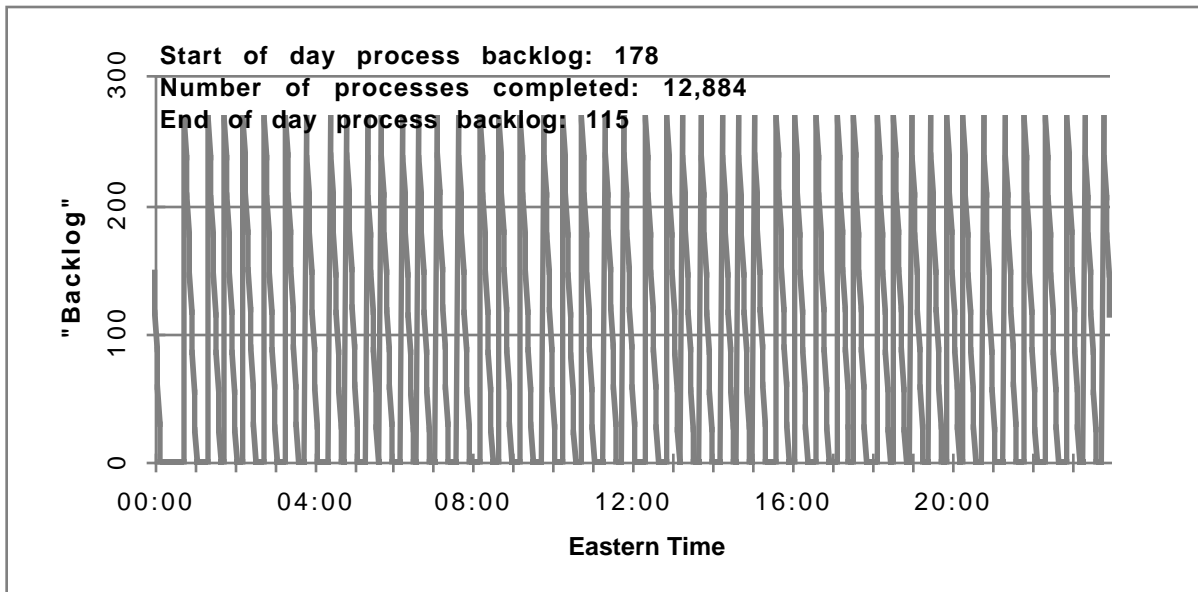


Figure 5.4.3.1-13. GSFC AM-1/MODIS/Reprocessing Process Backlog

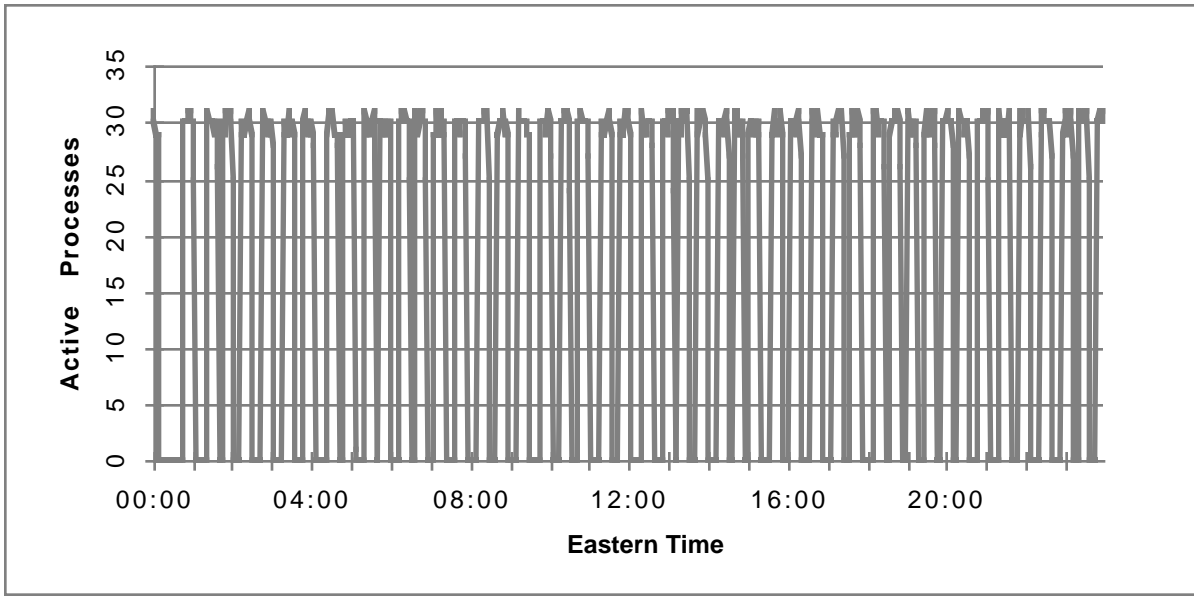


Figure 5.4.3.1-14. GSFC AM-1/MODIS/Reprocessing Active Processes

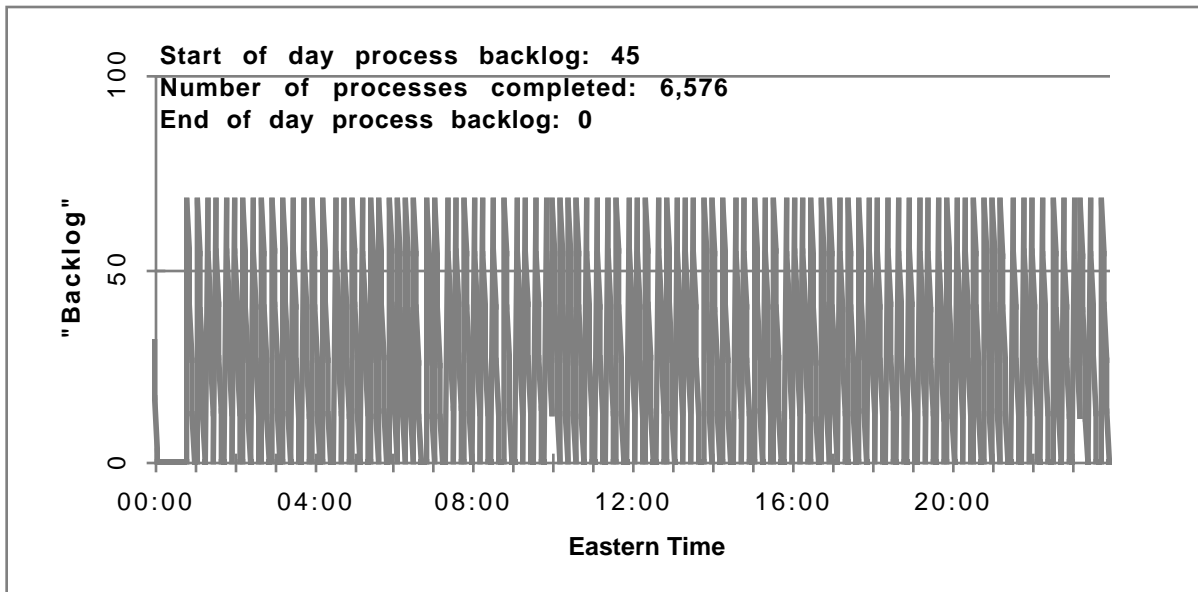


Figure 5.4.3.1-15. GSFC AM-1/Subsetting/Reprocessing Process Backlog

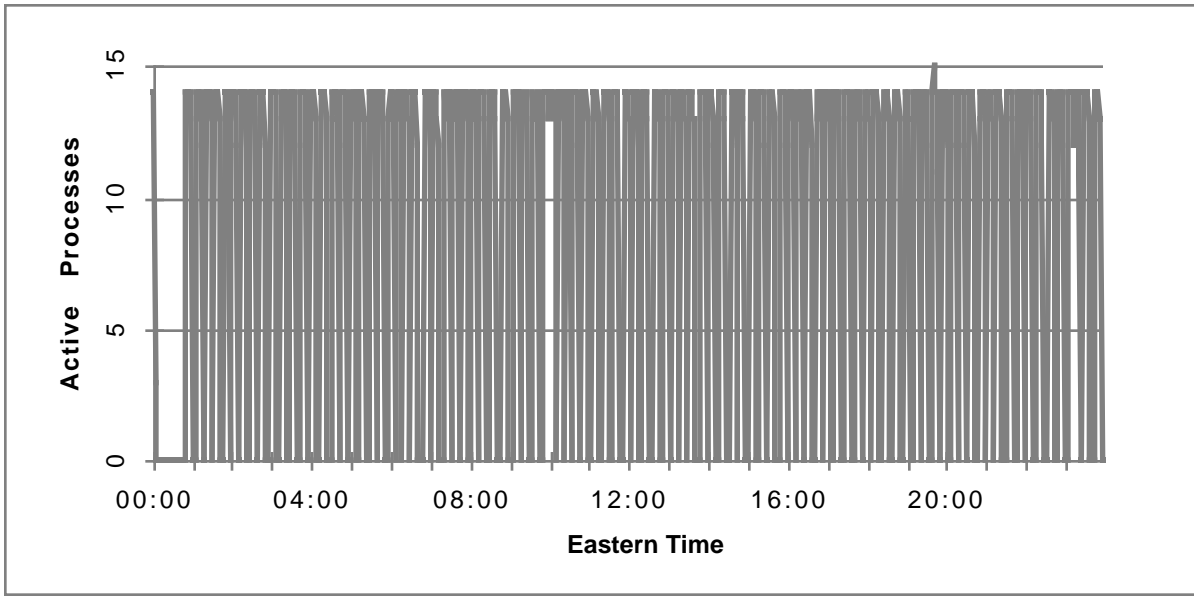


Figure 5.4.3.1-16. GSFC AM-1/Subsetting/Reprocessing Active Processes

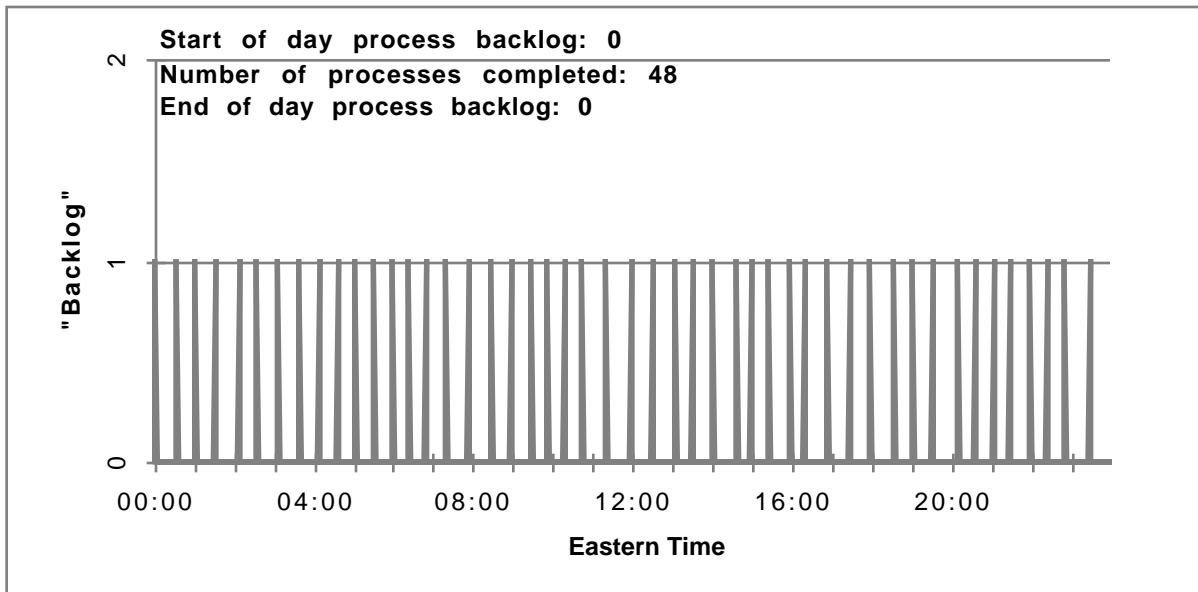


Figure 5.4.3.1-17. GSFC FOO/COLOR/Reprocessing Process Backlog

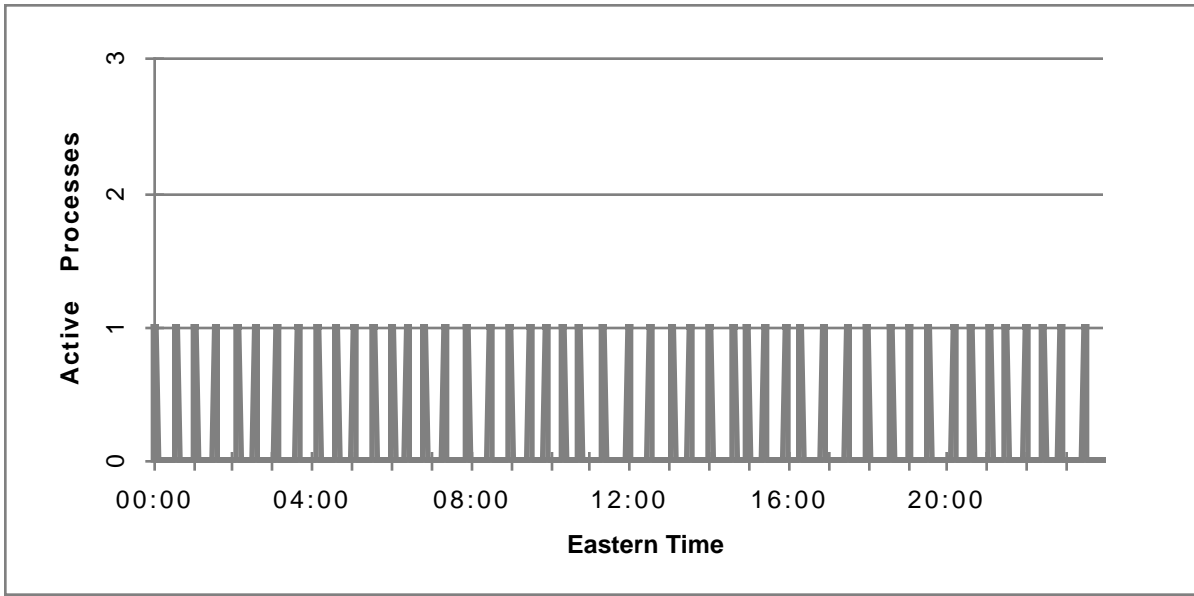


Figure 5.4.3.1-18. GSFC FOO/COLOR/Reprocessing Active Processes

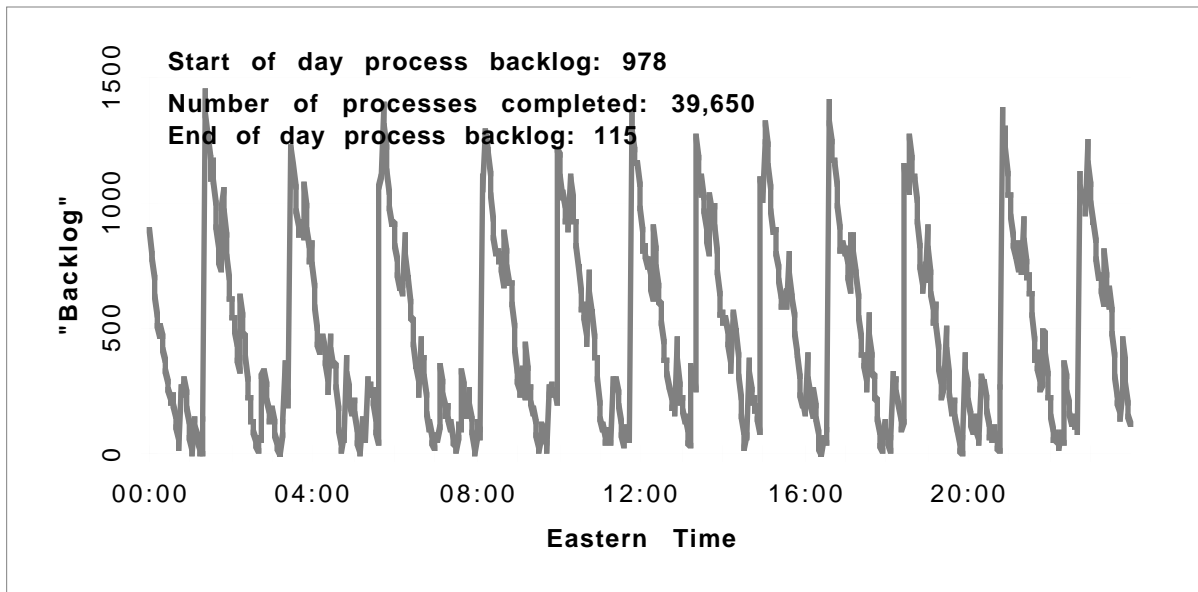


Figure 5.4.3.1-19. GSFC Composite Process Backlog

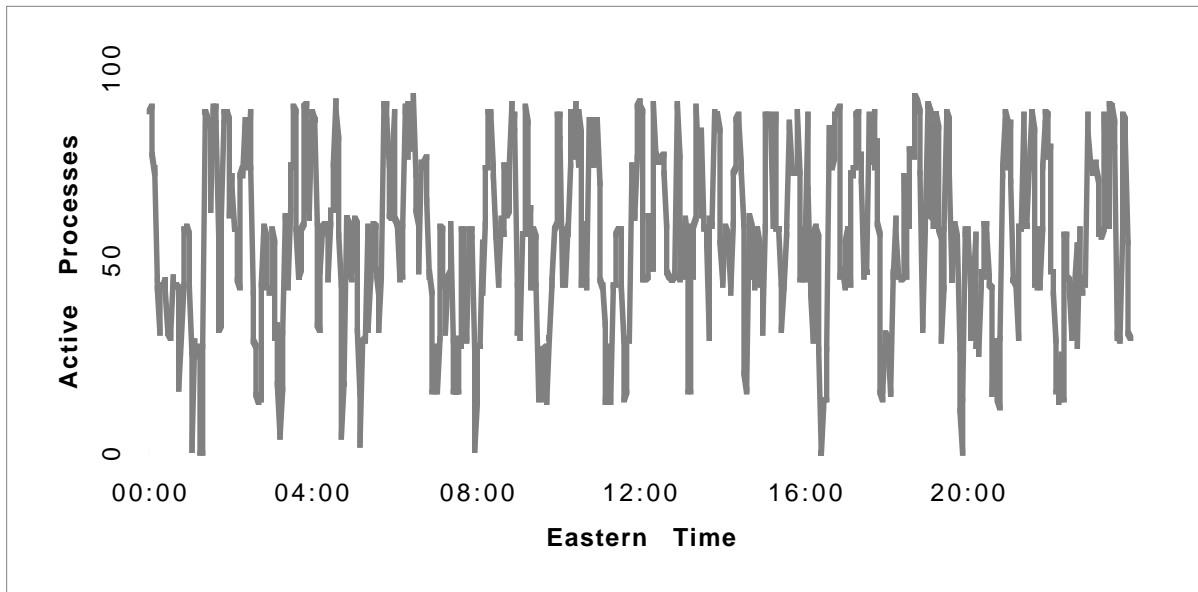


Figure 5.4.3.1-20. GSFC Composite Active Processes

5.4.3.2 GSFC Archive Operations

The Production Monitor/QA positions monitor the insertion of files into the archive. The figures in this section show the archive writes for activities shown in Table 5.4.3-1.

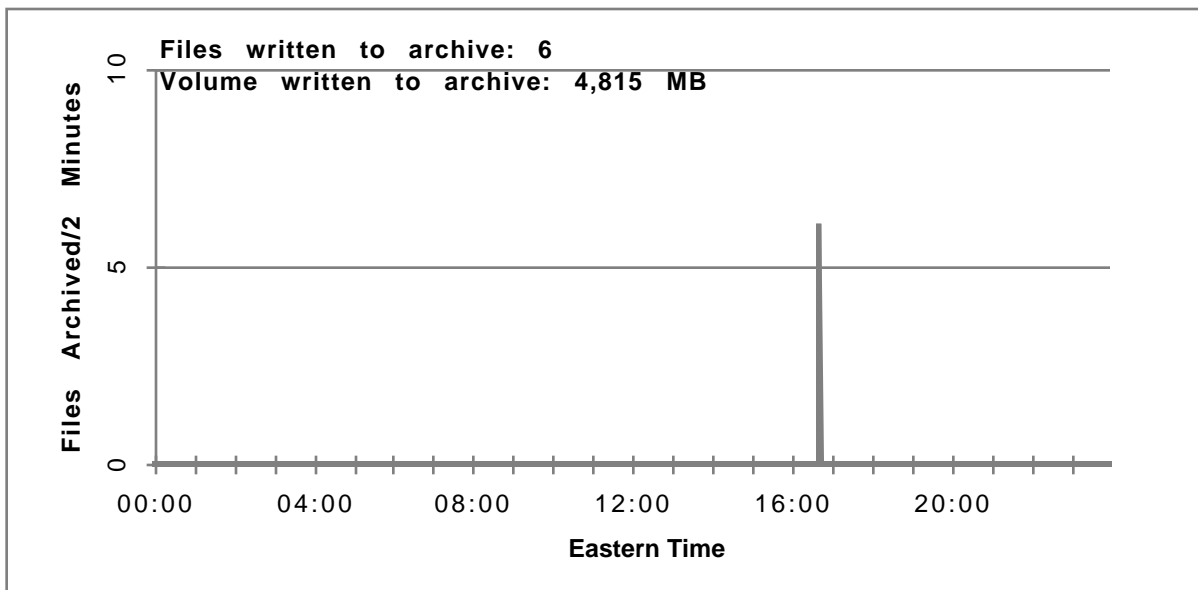


Figure 5.4.3.2-1. GSFC TRMM/GV/Processing Archive Writes

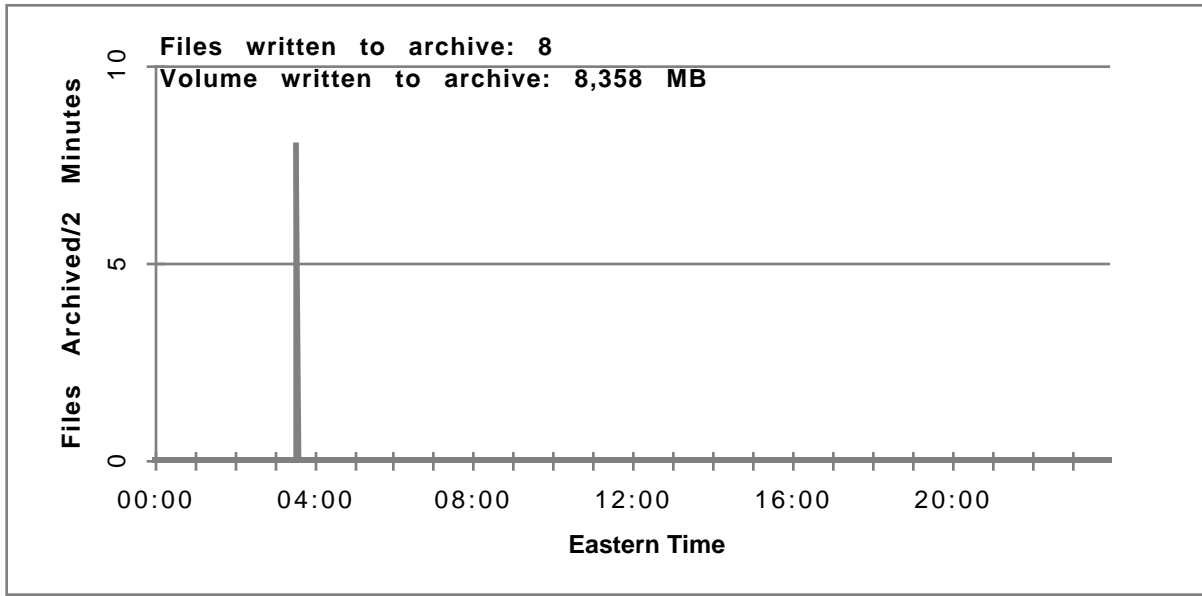


Figure 5.4.3.2-2. GSFC TRMM/PR/Processing Archive Writes

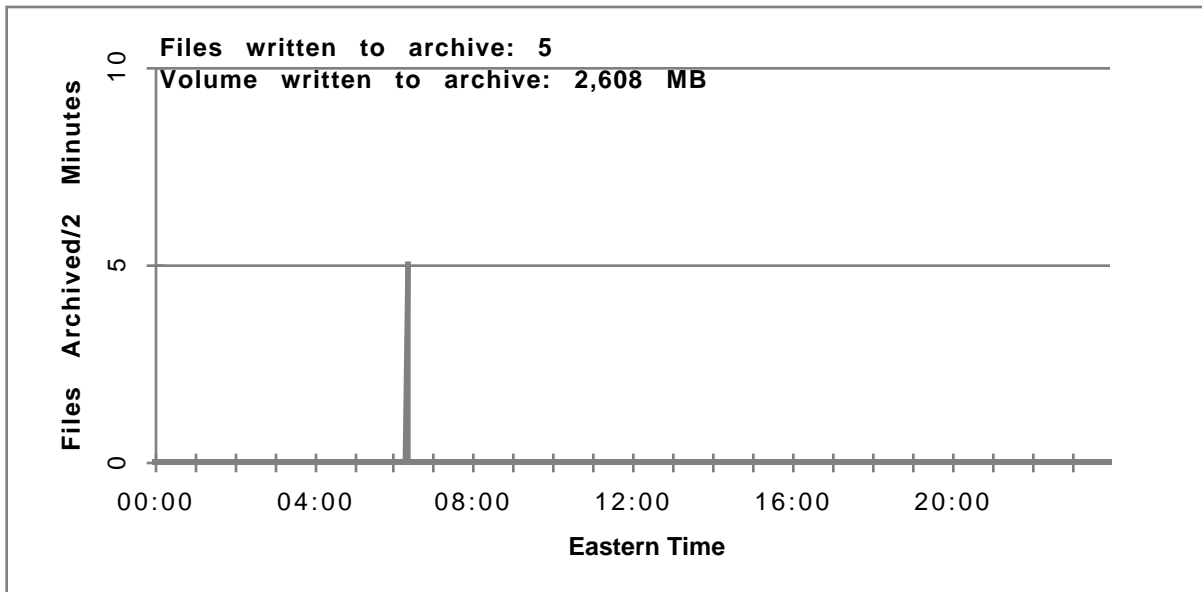


Figure 5.4.3.2-3. GSFC TRMM/TMI/Processing Archive Writes

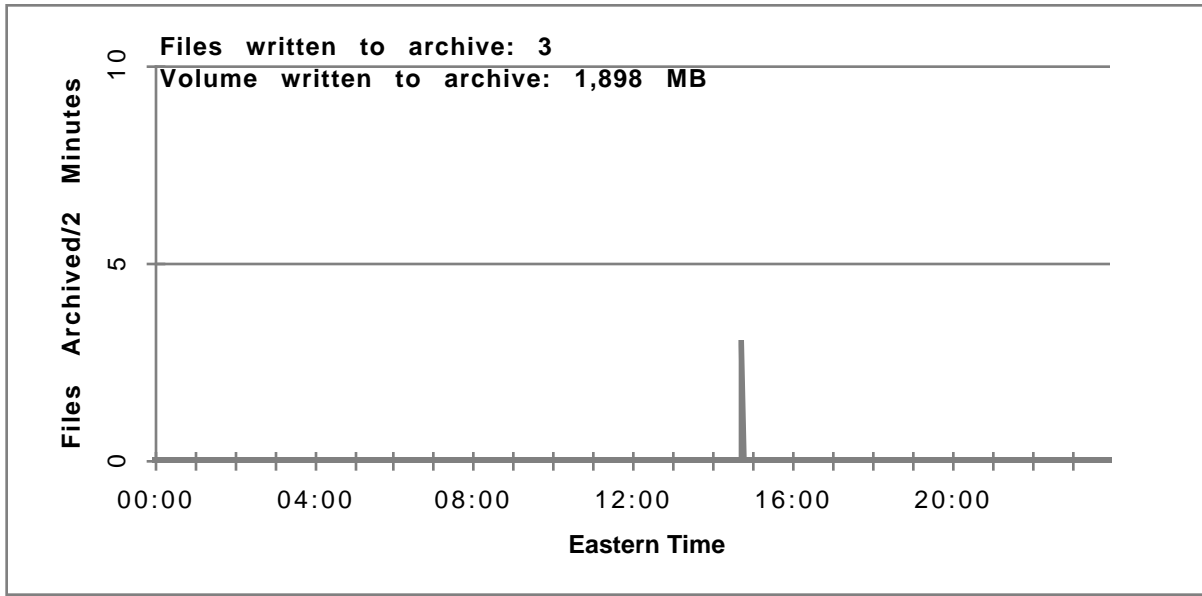


Figure 5.4.3.2-4. GSFC TRMM/VIRS/Processing Archive Writes

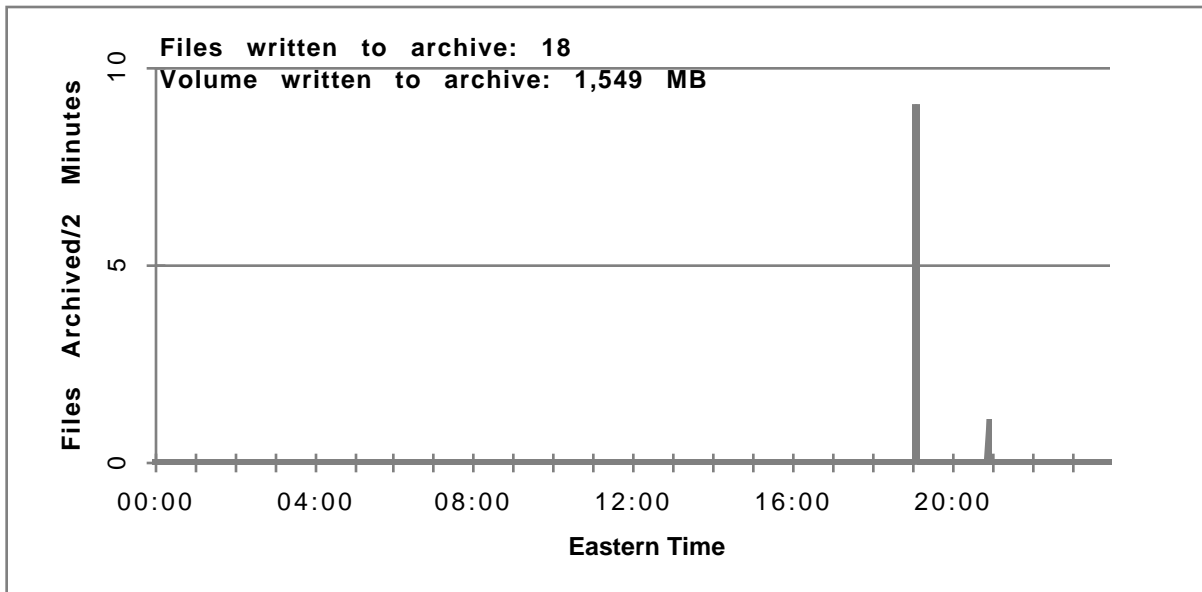


Figure 5.4.3.2-5. GSFC TRMM/LIS/Processing Archive Writes

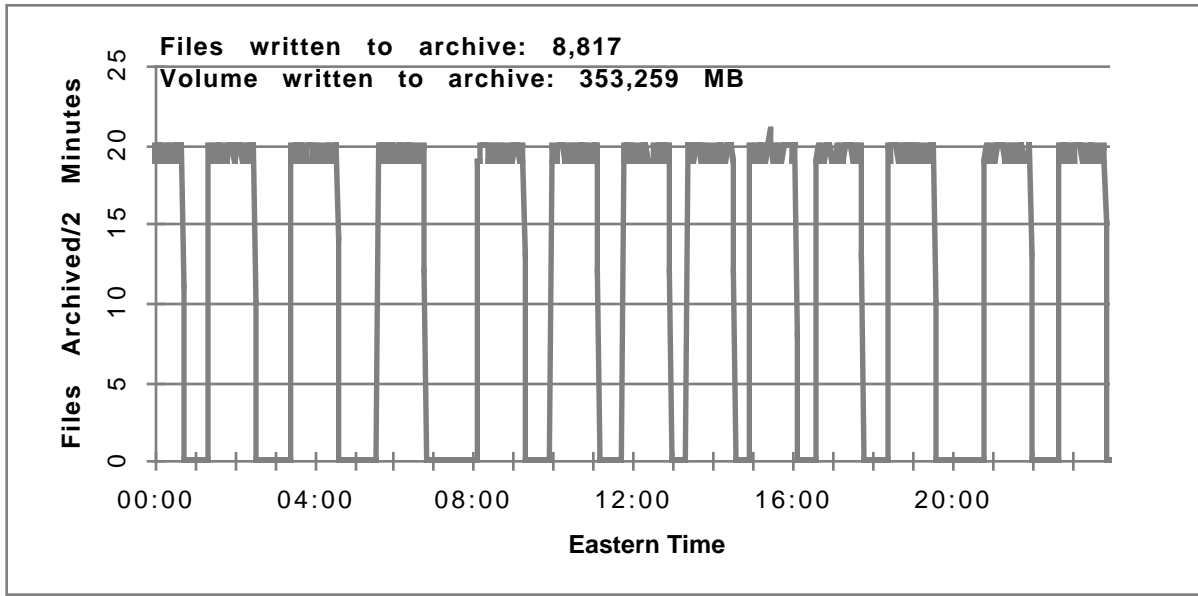


Figure 5.4.3.2-6. GSFC AM1/MODIS/Processing Archive Writes

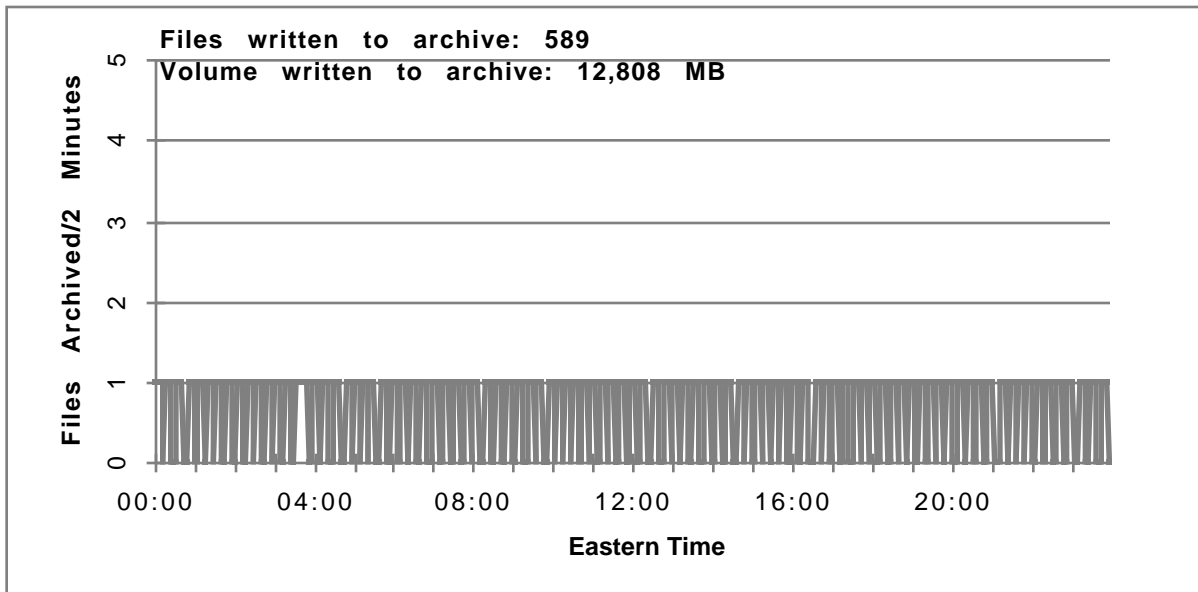


Figure 5.4.3.2-7. GSFC AM1/Subsetting/Processing Archive Writes

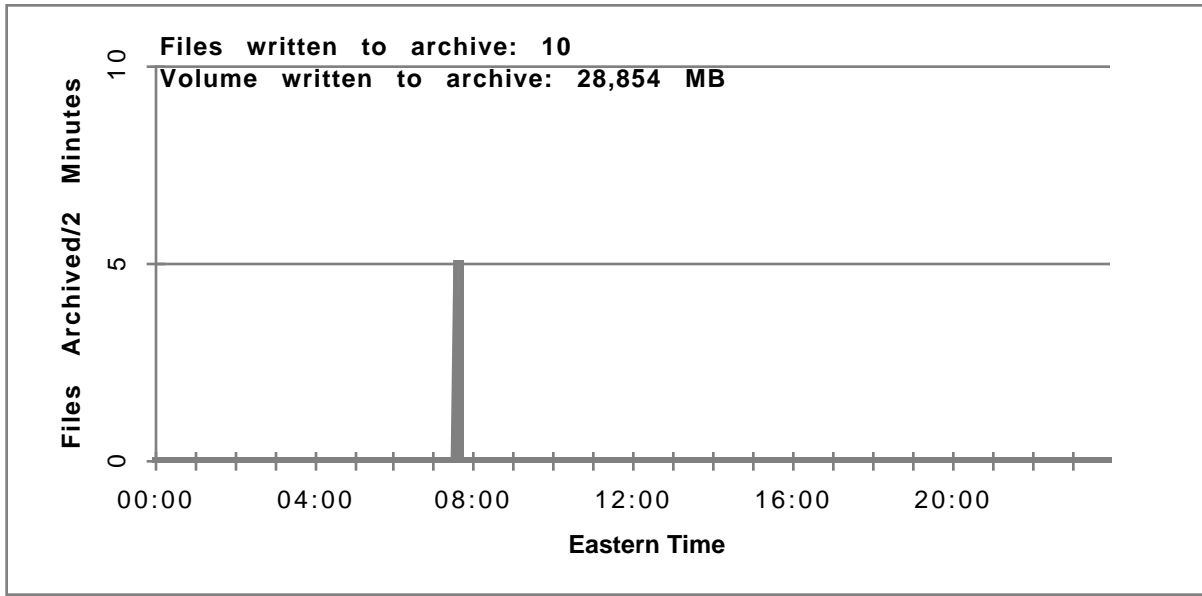


Figure 5.4.3.2-8. GSFC DAO/DAS/Processing Archive Writes

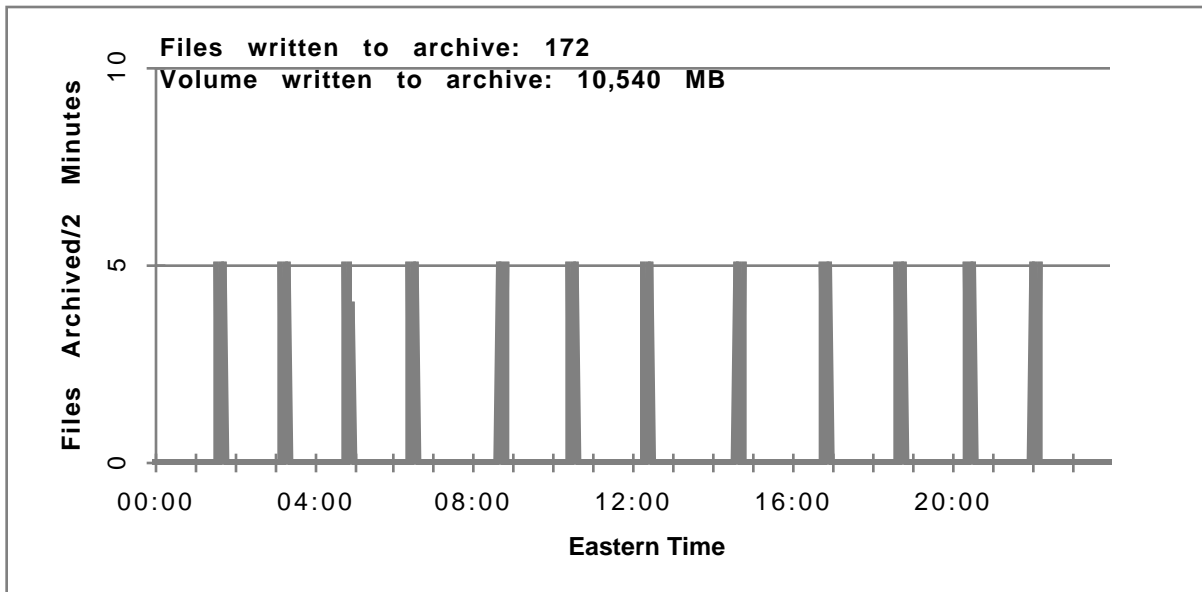


Figure 5.4.3.2-9. GSFC FOO/COLOR/Processing Archive Writes

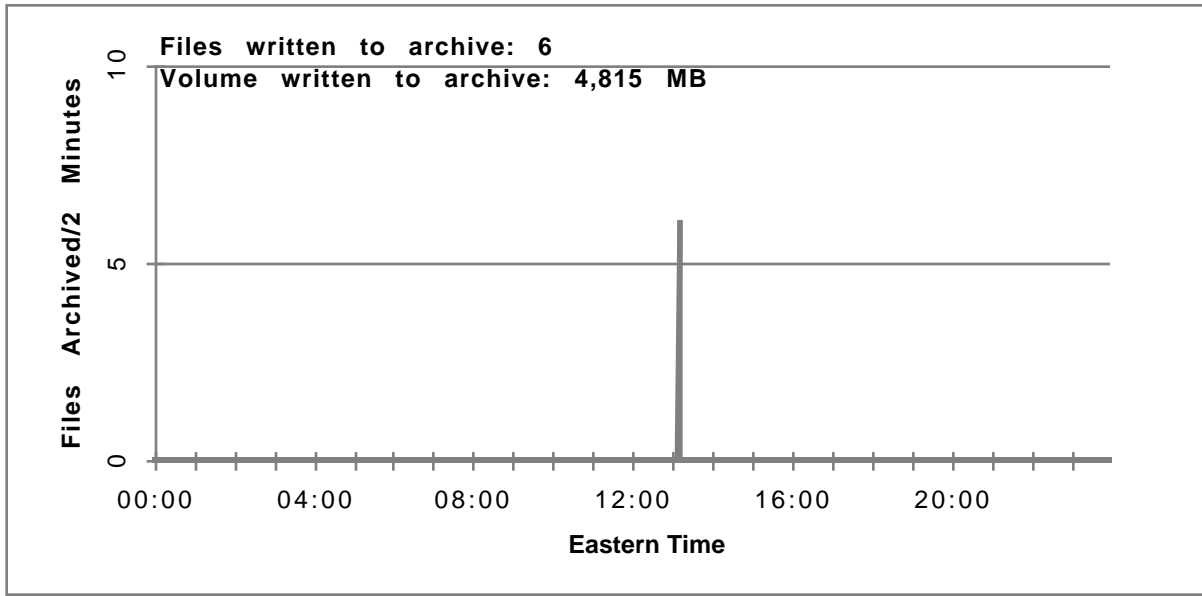


Figure 5.4.3.2-10. GSFC TRMM/GV/Reprocessing Archive Writes

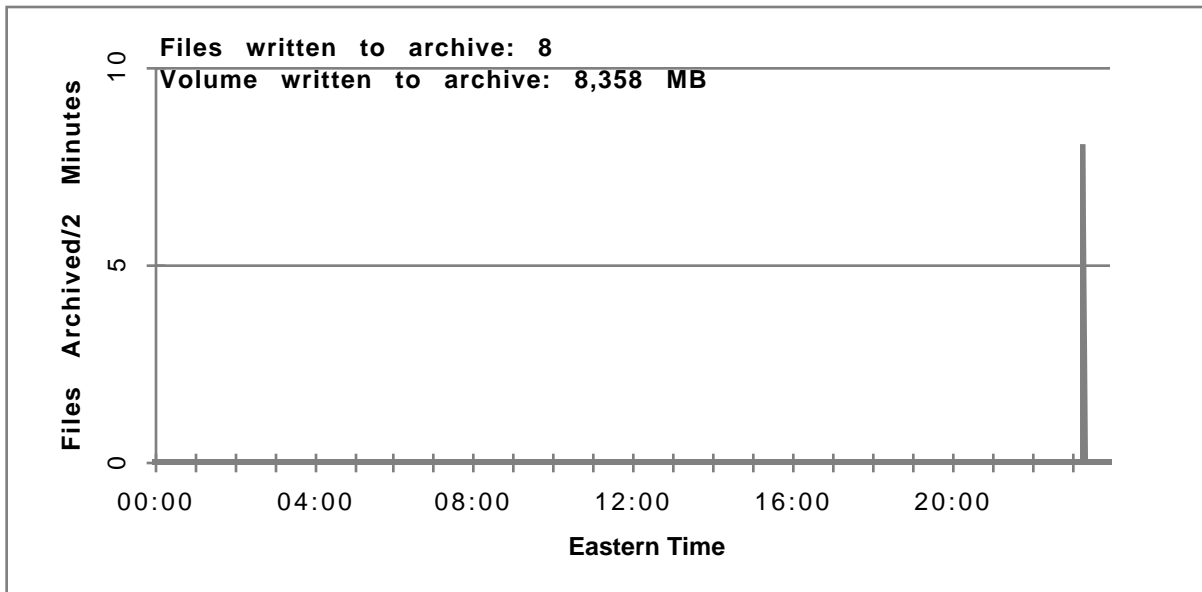


Figure 5.4.3.2-11. GSFC TRMM/PR/Reprocessing Archive Writes

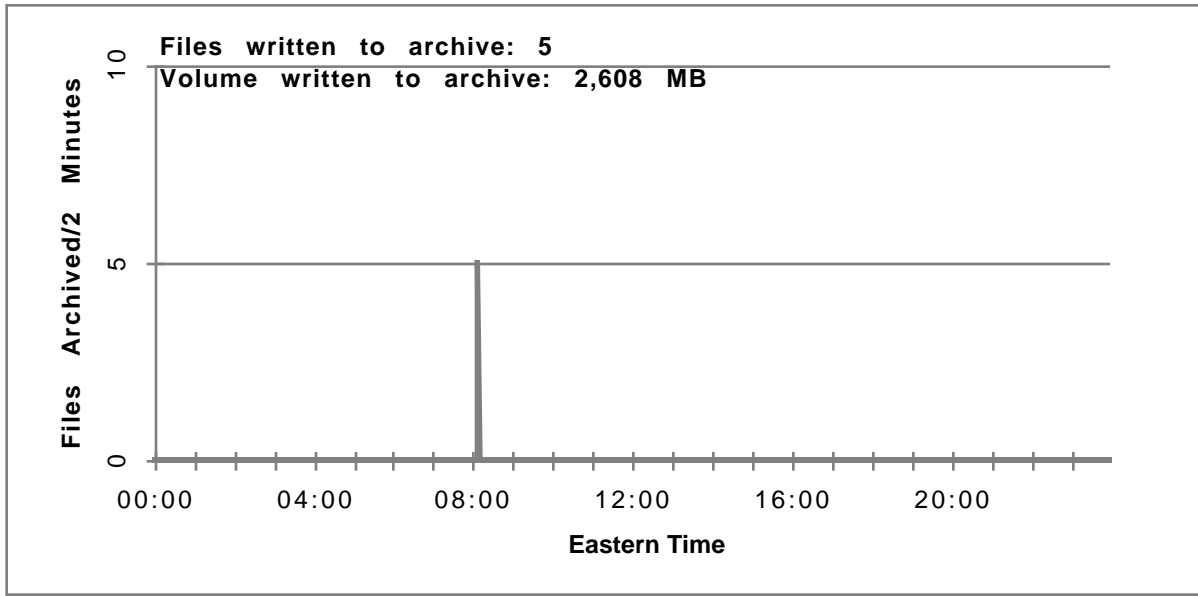


Figure 5.4.3.2-12. GSFC TRMM/TMI/Reprocessing Archive Writes

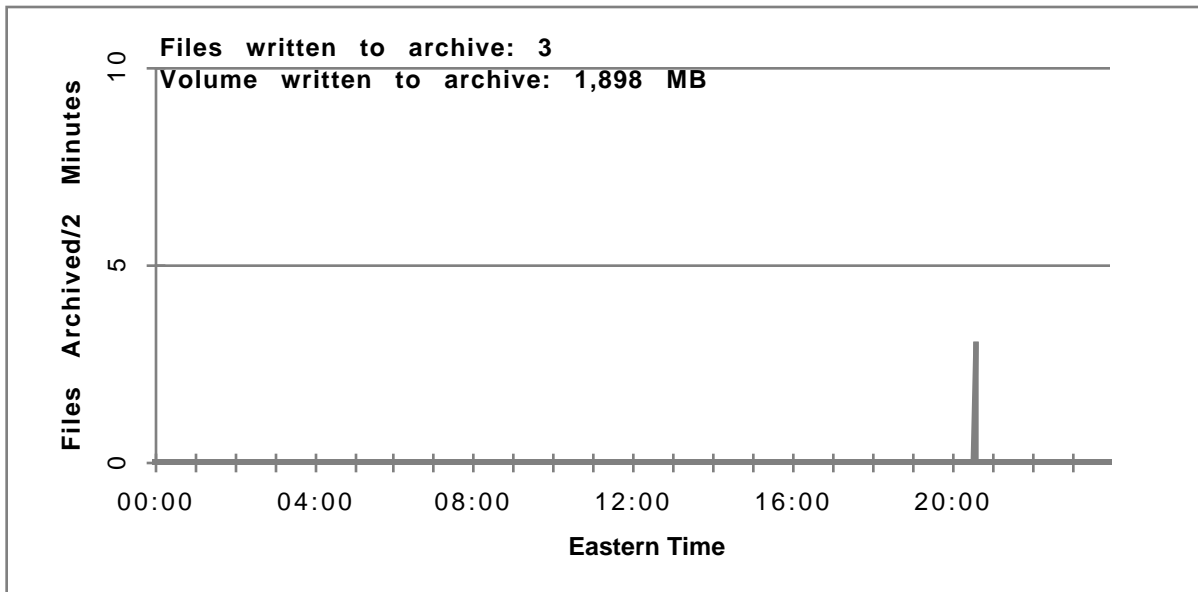


Figure 5.4.3.2-13. GSFC TRMM/VIRS/Reprocessing Archive Writes

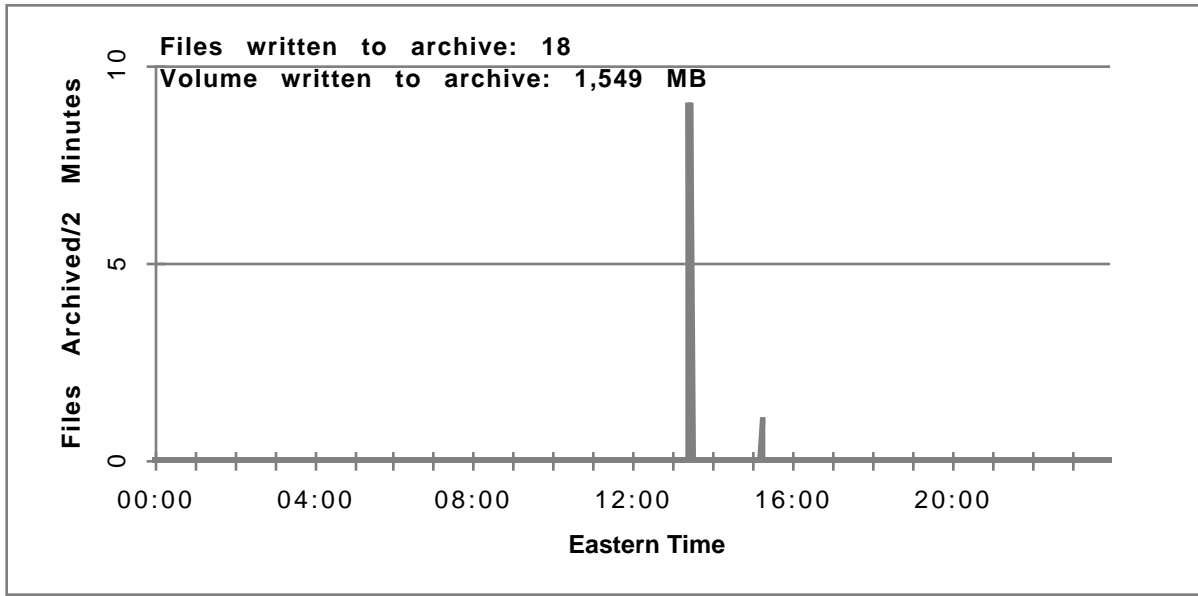


Figure 5.4.3.2-14. GSFC TRMM/LIS/Reprocessing Archive Writes

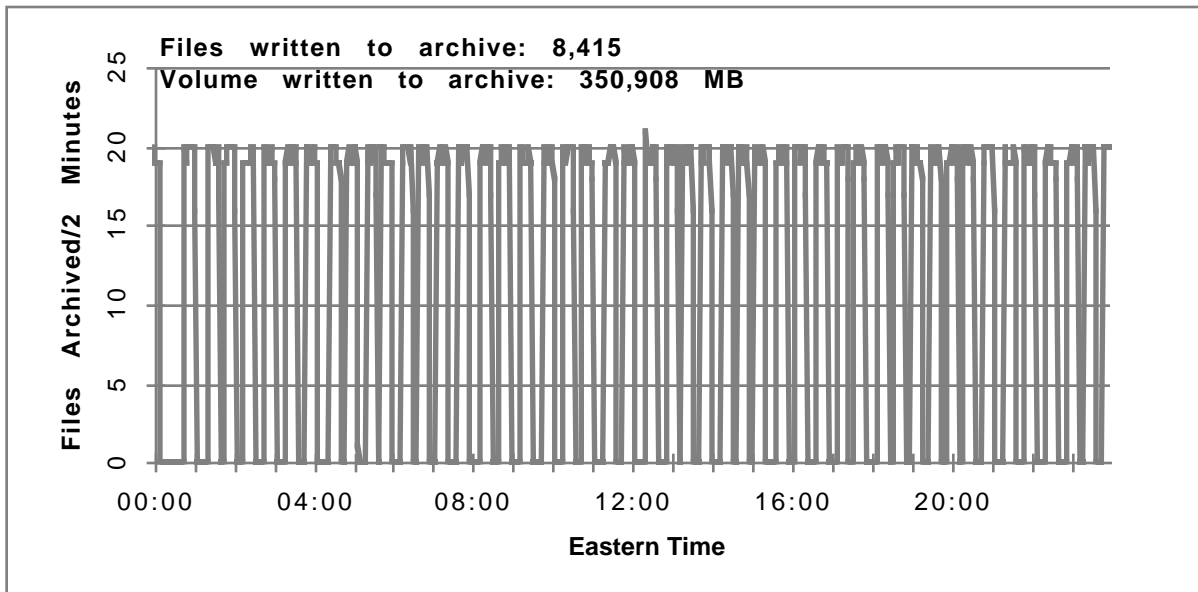


Figure 5.4.3.2-15. GSFC AM1/MODIS/Reprocessing Archive Writes

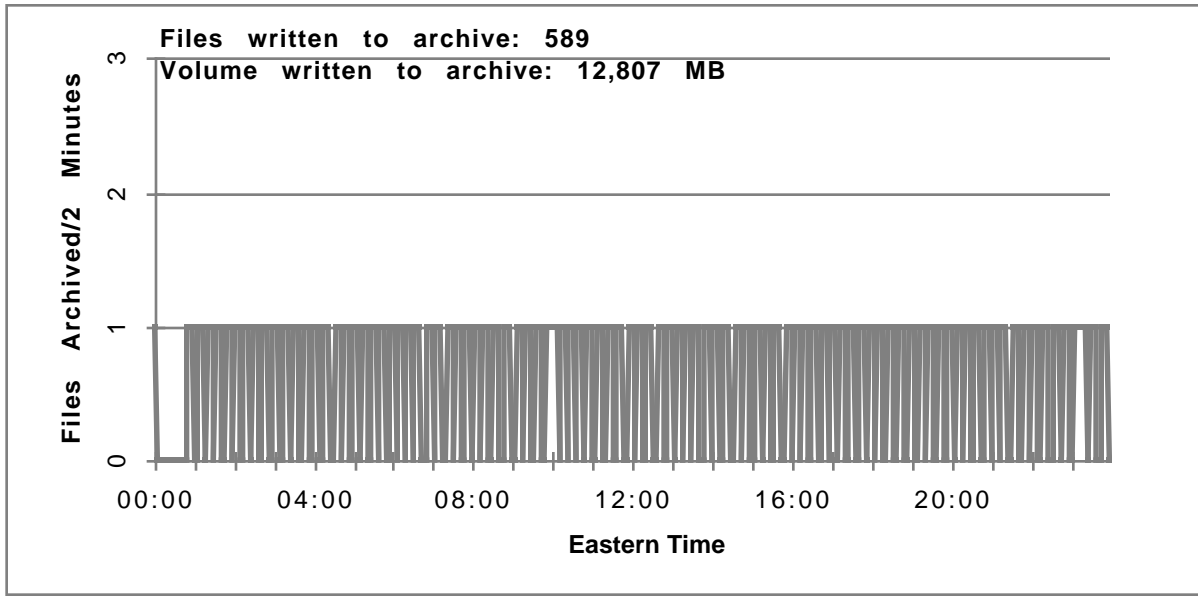


Figure 5.4.3.2-16. GSFC AM1/Subsetting/Reprocessing Archive Writes

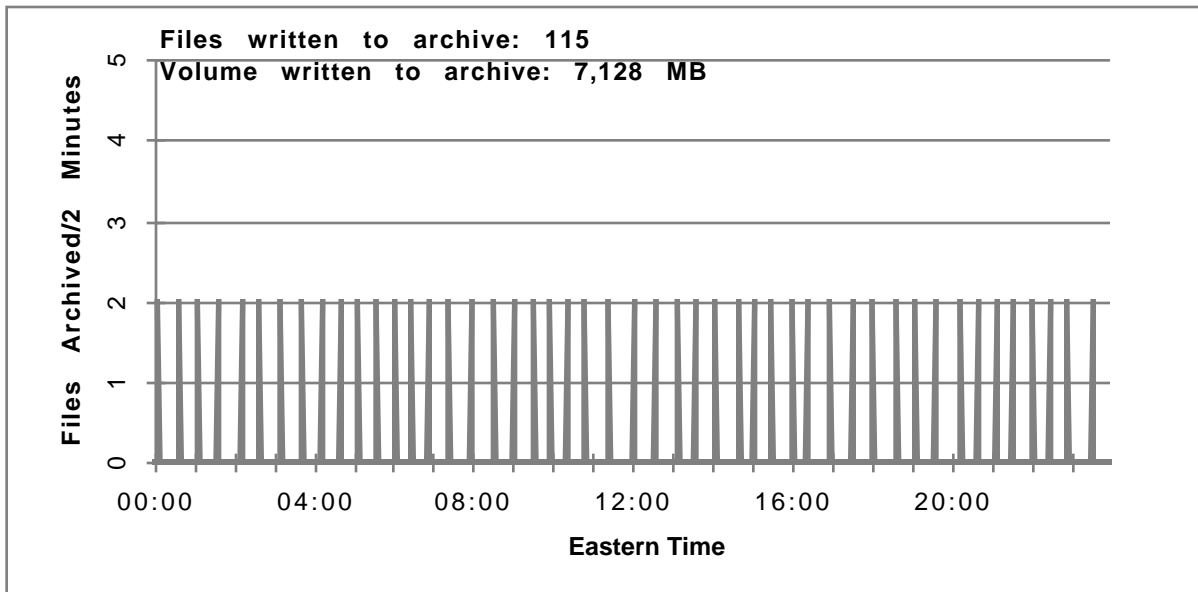


Figure 5.4.3.2-17. GSFC FOO/COLOR/Reprocessing Archive Writes

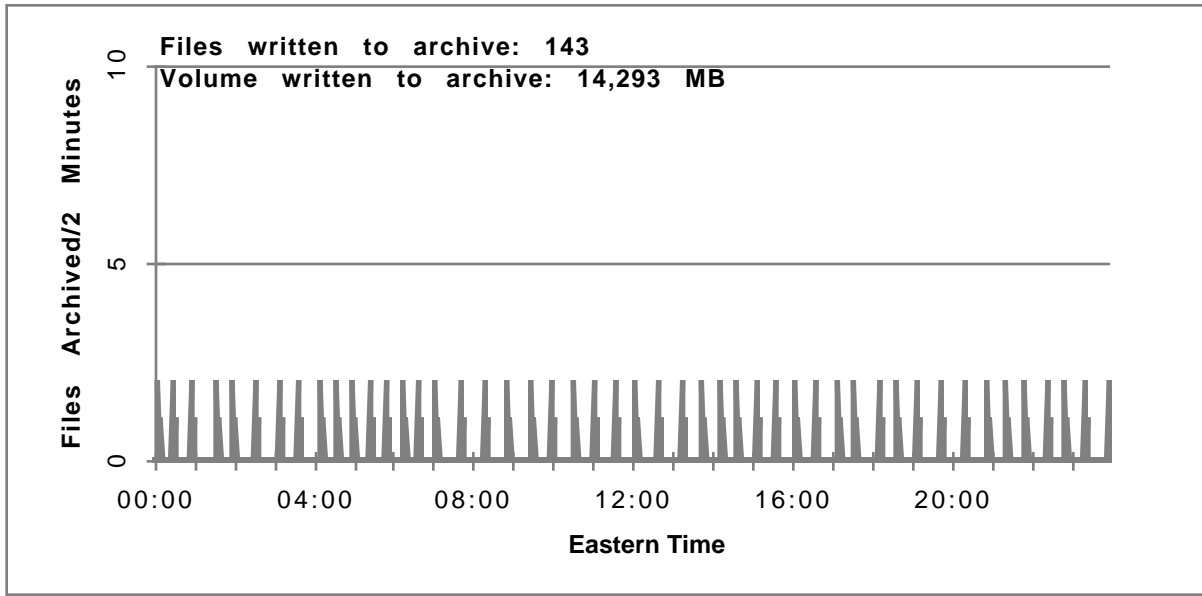


Figure 5.4.3.2-18. GSFC V0 Migration Archive Writes

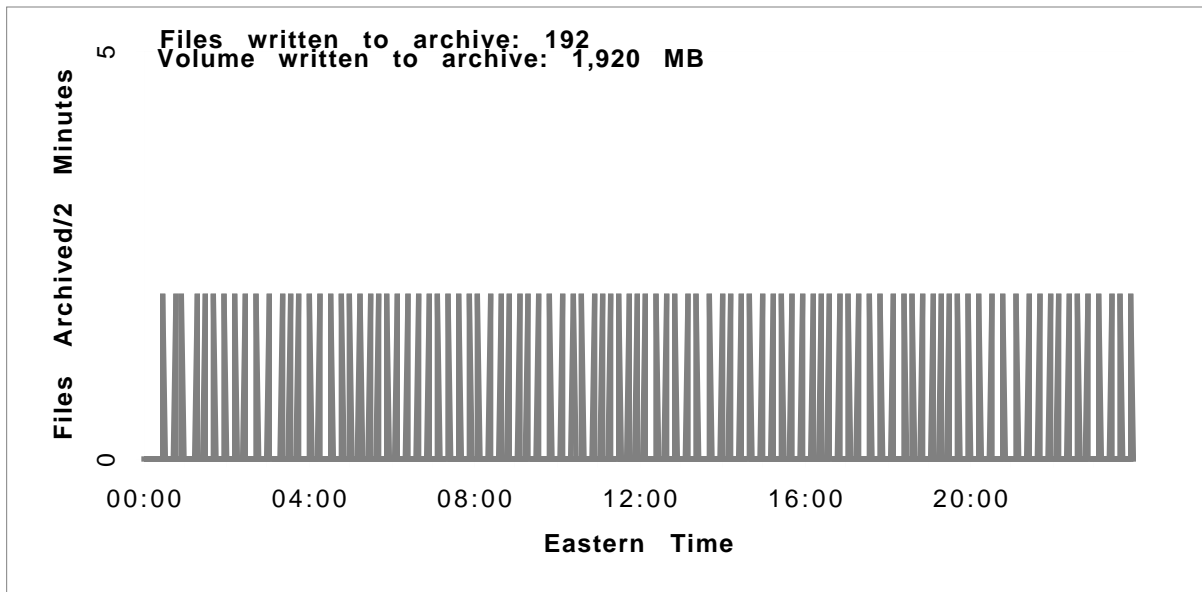


Figure 5.4.3.2-19. GSFC Ad Hoc Archive Writes

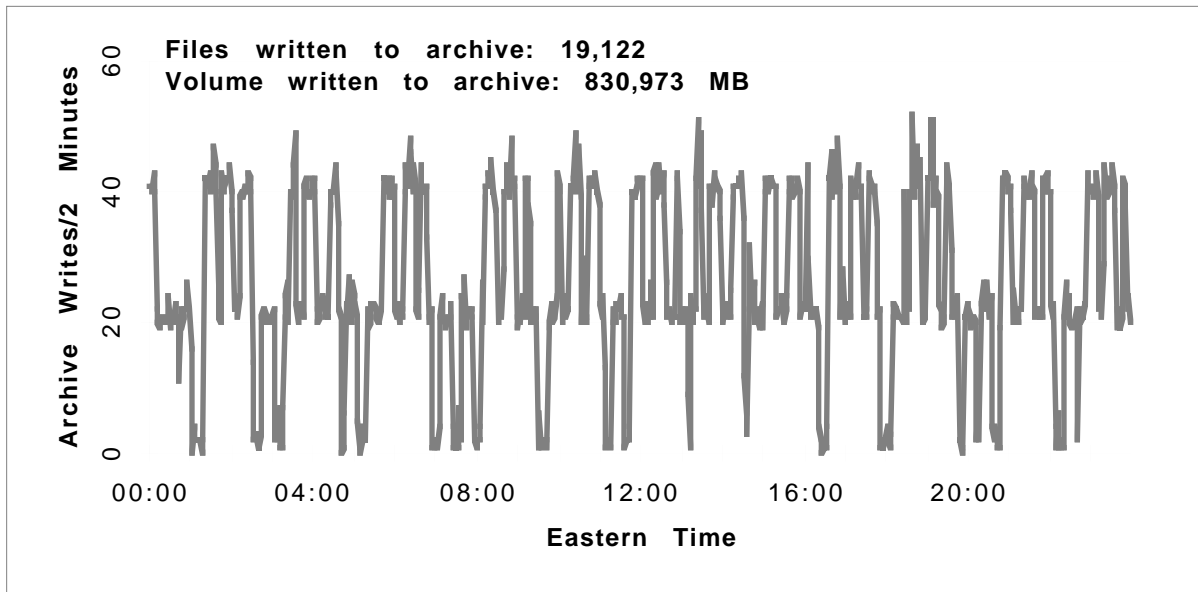


Figure 5.4.3.2-20. GSFC Composite Archive Writes

5.4.3.3 GSFC Product Distribution Operations

5.4.3.3.1 GSFC Hard Media Distribution Operations

Table 5.4.3.3-1 summarizes the key parameters that influence distribution of hard media. The following steps in the creation of a media shipment are assumed:

1. Load media and initialize. The operator prints and applies the media labels, loads the media (either CD or Tape), and initiates writing of the media. It is assumed that any given order is limited to no more than 10 pieces of media. Larger orders are assumed to be segmented into multiple smaller orders.
2. Media creation. Data are written to the media.
3. Unload/reload. After the media are created, the media are unloaded and reloaded into a different device for a quality assurance read check.
4. Media QA. All data written to the media are read and compared to the original data.
5. Package. Media are unloaded, packaged, addressed, etc.

Figure 5.4.3.3-1 shows the day's hard media distribution backlog in terms of orders and media (and how it changed throughout the work day) for all data sets distributed by ECS. Figure 5.4.3.3-2 shows distribution of orders and number of media mapped against order size. Table 5.4.3.3-2 summarizes the day's media creation and distribution activities.

Table 5.4.3.3-1. GSFC Hard Media Distribution Parameters

Topic	Assumption
Hours of hard media distribution	7 days per week, 24 hours per day
Number of media distribution operators	1 per shift*
Touch time assumptions: 1. Load media and initialize 2. Media creation 3. Unload/reload 4. Media QA 5. Packaging	5 min. for 1st piece in an order, 1 min. for each additional piece of media Tape: • 500 KB/sec CD-ROM • 250 KB/sec 5 min. for 1st piece in an order, 1 min. for each additional piece of media See step 2 10 min. for 1st piece in an order, 2 min. for each additional piece of media
Minimum order size	100 MB
Media volume capacity 1. CD-ROM 2. Tape	2,000 MB 10,000 MB

* May also perform other functions including hard media ingest and/or mail distribution

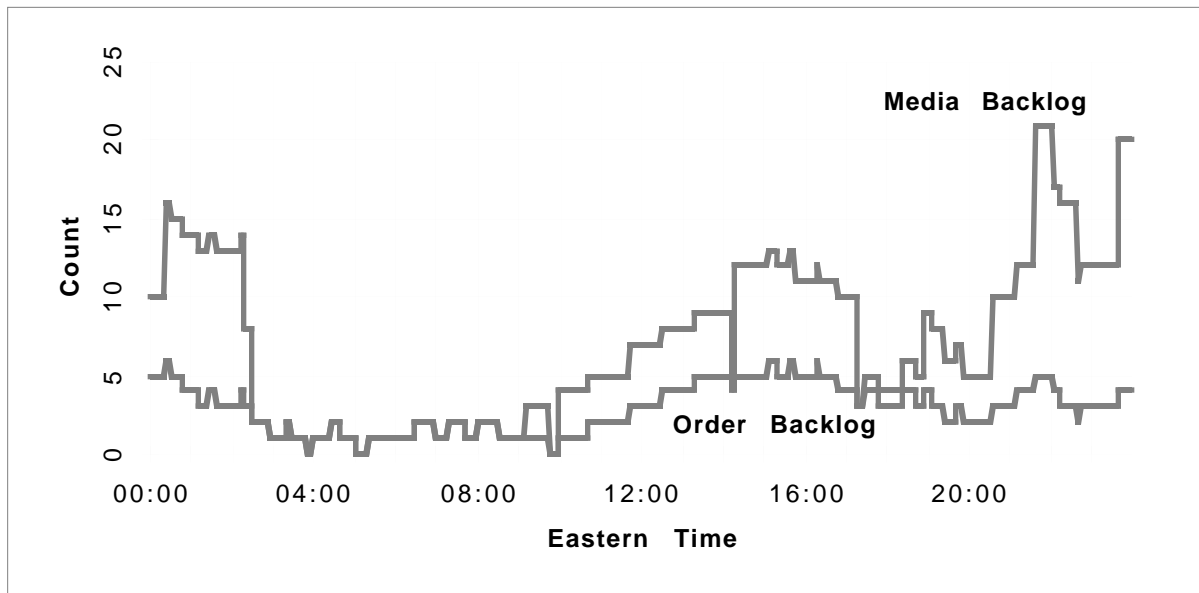


Figure 5.4.3.3-1. GSFC Hard Media Distribution Backlog

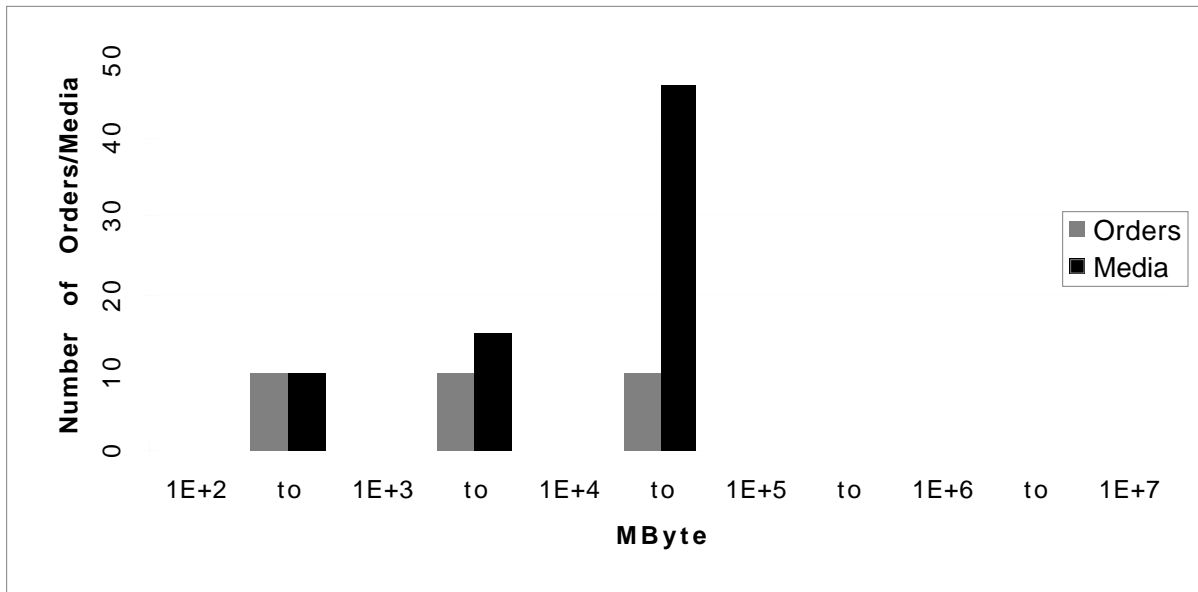


Figure 5.4.3.3-2. GSFC Orders and Media by Order Volume

Table 5.4.3.3-2. GSFC Media Distribution Summary

Topic	Number of orders	Volume (MB)	Number of media
Start of day in work	4	89,935	13
Start of day backlog	5	51,597	10
Orders received	30	409,307	72
Data distributed	30	295,396	56
End of day in work	4	71,553	18
End of day backlog	4	183,544	20

5.4.3.3.2 GSFC Electronic Distribution Operations

Electronic distribution is performed 24 hours/day, 7 days/week. Figure 5.4.3.3-3 shows the day's distribution of user sessions that connect to ECS through the GSFC DAAC.

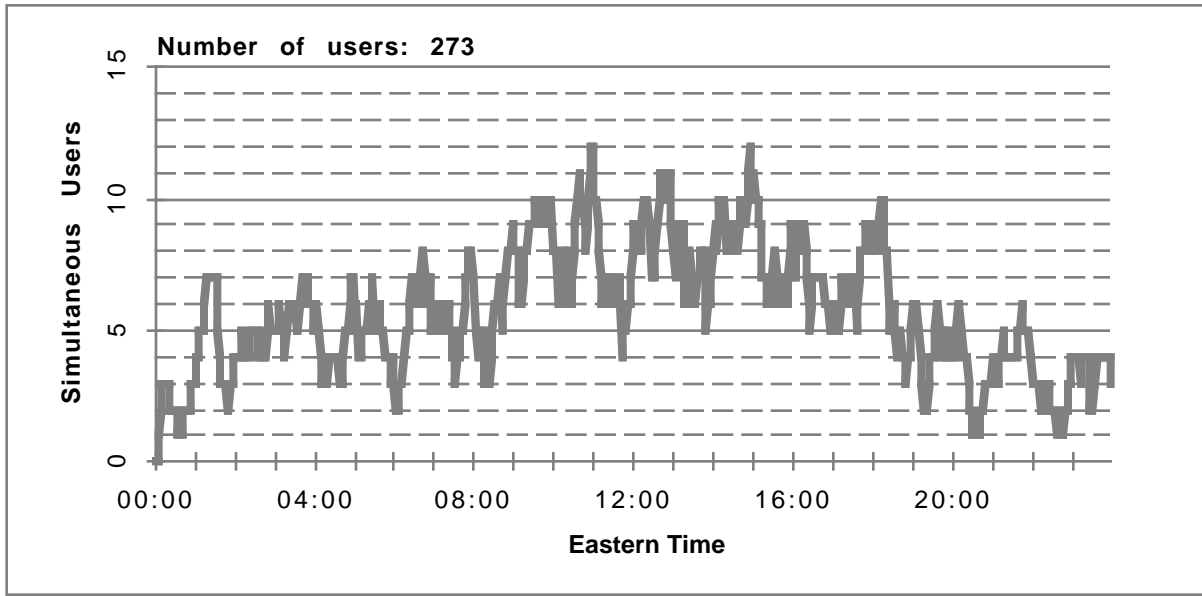


Figure 5.4.3.3-3. GSFC User Sessions